The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. X. No. 259 MAY 31, 1924 Prepaid Annual Subscription United Kingdom, £1.1.0: Abroad, £1.6.0.

Contents

NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE *is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders and Postal Orders should be made payable to Benn Brothers, Ltd.*

Editorial and General Offices—8, *Bouverie St., London, E.C.4.*
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (6 lines)

Overseas Trade

THE sketch of the machinery and processes of export trade published in this issue indicates what a complicated process the shipment of goods overseas is, and yet how simple it has become in actual practice. This simplicity is the result of accumulated knowledge and practice; it is something like the simplicity of the railway system or our newspaper organisation, as it appears to those engaged in and long familiar with its working, although to the outsider it looks a mass of impossible complications. The smoothness with which our vast overseas trade works is largely due to the merchant shippers' quiet mastery of all the details. Between a purchaser in the Argentine and in Australia and the producer in London or Manchester there is a vast space which has to be bridged by commercial machinery and a network of agencies. Once in a way, perhaps, a British firm may get a direct order from some distant purchaser and send a machine or a parcel of chemicals direct to him. But that is not the method usually followed. The export merchant class, as Mr. F. T. T. Reynolds truly puts it, have eyes and ears in every market in the world. It is their business to find out what is wanted, and equally their business to supply it, and a system has grown up under which they act as general suppliers of the requirements of regular clients. Not only does this relieve the business men at both ends of a mass of troublesome detail, but it greatly simplifies the finance of business, and provides a regular flow of goods for our mercantile marine service. Instead of cash being sent from one side of the world to the other in respect of each transaction, there is a recognised system of exchange by which goods going out pay for goods coming in, accounts are balanced against one another, and the whole machinery goes along almost automatically.

Our system of overseas trade largely explains the strength and growth of the British Empire. It has enabled us to keep in touch with our Dominions and their constantly expanding trade, and it has enabled us to maintain the most intimate relations with our kindred overseas. It is encouraging to find Parliament taking the serious view of export trade which was indicated in the recent debate on a proposal to appoint an export trade committee of inquiry. We think Mr. Sidney Webb was right in looking for guidance in such a matter not so much to High Court judges trained to hear and weigh evidence as to practical men of business—manufacturers, traders, Chambers of Commerce, and so on. And it was encouraging, too, to hear from the President of the Board of Trade that, despite the devastation of the war and the inauguration of Imperial Preference, the distribution of our total trade throughout the world remained remarkably stable. For example, in 1913, Europe took 34 per cent. of our exports, and in 1923, 33·7 per cent. In 1913, the Empire took 36·3 per cent. of our exports, and in 1923, 35·5 per cent. The same continuity is to be observed in our trade with foreign countries. For example, the United States took 16·2 per cent. in 1913 and 16·8 per cent. in 1923, notwithstanding the tariff; while the Far East took 8·6 per cent., as against 8·4 per cent., despite the chaos in China. It is to be understood, of course, that all these percentages are upon a diminished volume of trade, but the figures are nevertheless remarkable. With increased attention to the needs of overseas markets, a fuller recognition of science in business such as Major Church pleaded for, and closer co-operation among all interests affected, we see no reason why the part of Great Britain in the overseas trade of the world should be less distinguished than it has been in the past.

Sulphate Sales on a New Basis

THERE seems to be very good ground for supposing that the basis upon which sulphate of ammonia has been sold for so long will shortly be modified. For some reason contracts and sales of this fertiliser have always been based upon a definite percentage of ammonia, seller and buyer usually agreeing that the ultimate price paid shall be adjusted on a *pro rata* arrangement after the analyst's report of the sample has been received. For instance, before the British producer had learnt the value and necessity of manufacturing a

neutral salt it was customary for a definite price to be named on a basis of 25¼ per cent. of ammonia, the material in the majority of parcels frequently testing rather below this. To-day the producer of fertilisers is having to deal with consumers who are well alive to those particular properties by which the value of chemical substances of the kind may best be gauged, and there is no doubt that nitrogen is the all-important factor which influences the purchaser.

For this reason, it is a matter for some surprise that the old ammonia basis has survived for so long, and a change over to the nitrogen basis should prove a strong commercial point in furthering the use of sulphate. Re-arrangement of the standard on these lines will not, of course, affect the price per ton received for sulphate of ammonia, for it will merely be necessary to calculate the nitrogen basis equivalent to the present ammonia basis. In other words, if the price is quoted on a basis of 25¼ per cent. of ammonia, it would merely be necessary to alter the basis to 20¾ per cent. of nitrogen. For purposes of comparison the suggested new arrangement will be far more convenient when it comes to a question of judging the relative nitrogen values of fertilisers in the nitrogen group, and no doubt those who watch over the interests of sulphate of ammonia have not lost sight of the fact that, on a nitrogen basis, this material shows to advantage in comparison, for example, with nitrate of soda.

Manufactured Sodium Nitrate

A CORRESPONDENT, who is interested in methods relating to the manufacture of sodium nitrate, writes to point out that the only method at present employed for producing this compound is dependent on the absorption of oxides of nitrogen by soda ash. At Oppau and Merseberg the oxides of nitrogen are removed by scrubbing the gases with water and a solution of sodium carbonate, but a great drawback attaching to the process is the frothing caused by the evolution of carbon dioxide. Our correspondent suggests that a more direct method, and perhaps a more economical one when used in connection with an ammonia synthesis plant, would be to absorb the oxides of nitrogen in the converter gas from the ammonia oxidation section with a solution of caustic soda, the latter being obtained by the electrolysis of brine in the ordinary Castner process. The brine obtained at the Cerebos salt works at Greatham contains about 26 per cent. of sodium chloride, and on electrolysis 1 cubic metre of this brine yields about 178 kilos of sodium hydrate and 49 cubic metres each of chlorine and hydrogen. The liquor, which contains 17·7 per cent. of caustic soda, could be used direct for the absorption of the nitrogen oxides from the ammonia oxidation plant, absorption being effected by three stoneware towers in series, the towers being packed in the ordinary manner with broken quartz. Leaving the scrubbing towers the liquor would travel to the oxidation towers where the sodium nitrite (which is in solution with the nitrate) would be converted into nitrate.

Our correspondent does not state whether the process he has in mind has yet been tried out on a commercial scale, but his suggestion appears to present possibilities in the production of a manufactured sodium nitrate, and in addition to this product the process would give a supply of hydrogen (from the electrolysis of the brine) which could be used in the synthesis of ammonia, while it would not be difficult to find a use for the chlorine evolved.

Synthetic Ammonia at Billingham

FROM the scientific side the most interesting announcement at the annual meeting of Brunner, Mond and Co. was that relating to the progress of the synthetic ammonia works at Billingham. There is no disclosure of details as to plant, process, or output, but Mr. Roscoe Brunner stated in unequivocal terms that the very considerable difficulties have been surmounted and that the process is working to the company's complete satisfaction. So satisfactory, indeed, is the position that the staff is engaged in designing plant for an extension of output and for the production of ammonia salts other than sulphate. Though little or nothing has been heard of so notable a fact the British synthetic product is now actually on the market. The sulphate of ammonia produced at Billingham the Chairman claims to be "the purest on the market," and he adds that "it has met with great favour all over the world." Brunner, Mond and Co. have an honourable tradition for reticence about their own achievements, but here, since this is a national as well as an industrial achievement, many would welcome a little relaxing of the rule in order that the public may be enabled to realise what a great step forward this work at Billingham represents. In addition to this, the new works at Wallerscote point to further developments. The Chairman was unable to say when production would begin, but he ventured to claim that these works would be "the best in the world"—and it is against the practice of his company to use words idly. In view of the developments the company have in hand and the various circumstances reviewed in the speeches, such as the reduction of prices and the increase in fuel costs, the fractional reduction in the dividend need not cause alarm.

Chemical Students at Wembley

THE Institute of Chemistry is to be congratulated on the arrangements it is making in connection with its Students' Association for an organised visit of chemical students to Wembley on Tuesday, July 15. The student class are probably more likely to benefit from the chemical exhibits there and to appreciate their educational value than any other, and the first visit in July, we imagine, will have to be followed by others later. On the Tuesday morning an inaugural meeting will be held at University College, Gower Street, at which Professor Henderson will preside, Mr. Woolcock will explain the objects of the visit, and Professor W. P. Wynne will also speak. The party will travel by special train from Euston to Wembley, and will be shown round the Chemical Section in groups under the direction of Mr. Woolcock. Luncheon will follow in the Stadium Hall, and the rest of the day will be spent as the members think fit. On the following day (Wednesday) a party of students will visit Rothamsted Experimental Station at Harpenden, and Thursday will be spent in visits to the Institute, the Chemical Society's rooms, and other places of interest in London. The arrangements make possible a profitable and

economical visit of a few days to London, and the fact that the students of various universities will have an opportunity of meeting together should sensibly add to the attractions of the scheme. Mr. Marlow is acting as secretary to the committee in charge of the arrangements, and both the Registrar and himself are anxious to be of as much assistance as possible to all students interested in the proposed visit.

Specialisation and Team Work

AMONG the practical suggestions which occur towards the close of Sir William Pope's lecture on "The Outlook in Chemistry" (the concluding portion of which is published this week) is one of great interest respecting the development of team work alongside and to some extent as a corrective to the specialisation into which modern researchers have been forced. As a result of intensive studies the chemist has become largely a specialist and has been forced to settle down as "a cultivator of one minute patch of the vast chemical domain." If this tendency were allowed to develop unchecked and uncorrected, it is easy to see research resolving itself into detached bits and missing altogether its collective effect and meaning. Fortunately a corrective tendency towards combined action has become operative in the coal-tar colour and other industries. This tendency Professor Pope, in common with many observers, desires to see developed and applied to specific large branches of manufacturing industry. If chemical science, he argues, is to carry its full responsibility in connection with the amelioration of the conditions of life, far more must be done to ensure efficient team work in developing the applications of chemistry to human interests. The point is one that needs to be emphasised, and Professor Pope's plea will be generally endorsed

Society of Chemical Industry

IN addition to the nomination of Mr. W. J. U. Woolcock as president of the Society of Chemical Industry for next year in succession to Dr. E. F Armstrong, there are a number of changes in other directions. Mr. Julian L. Baker, Mr. C. S. Garland, Sir Max Muspratt, and Sir William Pope retire as vice-presidents, and their places will be taken by Dr. E. F. Armstrong, Professor J. W. Hinchley, Professor J. C. Philip, and Sir Richard Threlfall. For the four vacancies on the Council (caused by the retirement of Mr. John Allan, Professor Hinchley, Dr. J. H. Paterson and Mr. Woolcock), six candidates have been nominated, namely, Mr. W. A. S. Calder, Mr. W. H. Coleman, Dr. W. Cullen, Mr. F. W. Gamble, Mr. James MacGregor and Mr. J. Arthur Reavell—a list so good that members will be reluctant to make the necessary exclusions.

The programme for the Liverpool meeting on July 9–12 promises a pleasant balance of business and social gatherings. The only new feature since the last announcement is the subject of the retiring President's address. Dr. Armstrong has selected as the title, "A neglected Chapter in Organic Chemistry: The Fats," and his intimate knowledge of this branch of chemistry suggests a contribution of great interest and value.

Points from Our News Pages

A special article deals with the machinery and processes of export trade, and contains many points for manufacturers just taking up export business (p. 558).

The concluding sections are given of Sir William Pope's Trueman Wood Lecture on "The Outlook in Chemistry" (p. 564).

Reviews of some recent books are given (p. 563), including one on "Chemicals" in British Empire Trade in the series arranged by the F.B.I. (p. 561).

Further notes are given on the Chemical Section at the British Empire Exhibition, which now presents a considerably improved appearance (p. 568).

At the annual meeting of Brunner, Mond and Co., Ltd., reference was made to the achievement of the production in this country of synthetic ammonia (p. 572).

According to our London Market Report, business has been quietly steady during the past week (p. 580).

Business in the Scottish heavy chemical market remains poor according to our report (p. 583).

Books Received

COMPLEX SALTS. By William Thomas. London: Blackie and Son, Ltd. Pp. 122. 10s.

CHEMICAL SYNTHESIS. By Dr. Harry Hepworth. London: Blackie and Son, Ltd. Pp. 244. 20s.

THE GAS ENGINEER'S COMPENDIUM. London: Ernest Benn, Ltd. Pp. 292. 32s. 6d.

THE SPECIFIC HEATS OF GASES. By J. R. Partington and W. G. Shilling. London: Ernest Benn, Ltd. Pp. 252. 30s.

The Calendar

June 2	Society of Chemical Industry: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London, W.1.
3–6	Institute of Mining and Metallurgy: Empire Mining and Metallurgical Congress.	Conference Hall, British Empire Exhibition, Wembley.
4	Institute of Metals (Annual May Lecture): "Atoms and Isotopes." Dr. F. W. Aston.	Institution of Mechanical Engineers, London.
5	Chemical Society: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London, W.1.
5	Royal Society: Papers by Dr. V. Henri, W. Jevons, R. C. Johnson, Sir Richard Paget and others. 4.30 p.m.	Burlington House, Piccadilly, London.
5	Chemical Society: Ordinary Scientific Meeting. Papers by T. M. Lowry, H. S. French and H. Burgess. 8 p.m.	Burlington House, Piccadilly, London.
11	Faraday Society and the Textile Institute: General Discussion on Physical and Physico-Chemical Problems Relating to Textile Fibres." 2.30 to 6.30 p.m.	Conference Hall No. 4, British Empire Exhibition, Wembley.
11	Society of Dyers' and Colourists' Conference: "An Historical Survey of Dyeing and Calico Printing." J. R. Hannay. 3 p.m.	Conference Hall, British Empire Exhibition, Wembley.
11	Society of Dyers and Colourists: Annual Dinner.	Hotel Victoria, Northumberland Avenue, London, S.W.1.
12	Society of Dyers and Colourists: "Modern Methods of Dyeing." Professor A. G. Green. 11 a.m.	Conference Hall, British Empire Exhibition, Wembley.
12	Chemical Society: Faraday Lecture by Professor R. A. Millikan. "Atomism in Modern Physics." 5.30 p.m.	Royal Institution, Albemarle Street, London, W.1.
18	Society of Glass Technology: Meeting.	Sheffield.
19	Chemical Society: Ordinary Meeting. 8 p.m.	Burlington House, Piccadilly, London, W.1.
23–27	Twenty-Seventh Chemists' Exhibition.	Central Hall, Westminster, London.
24	National Physical Laboratory: Annual Visit of Inspection. 3–6 p.m.	Teddington.

Chemical Trade with Overseas Markets

A Practical Review of the Machinery and Processes of Export Trade

In the following article, which has been specially prepared for THE CHEMICAL AGE, *a simple but comprehensive survey is made of the general machinery and conditions of overseas trade, with special reference to shipment customs and regulations. Incidentally, it is pointed out that conditions are in many ways favourable at present for entering the export trade or developing existing trade connections overseas. Though familiar to experienced exporting houses, the detailed information will be of interest to traders less experienced in this branch of trade and to those who may contemplate entering overseas markets.*

STATISTICS for the twelve months of 1923 point to an advance in our overseas chemical trade to such an extent that it may be generally assumed that the return to the normal conditions prevailing before the disruption of the war is at hand. Indeed, as shown in our issue of March 29, countries such as the Argentine are to-day better customers for British chemicals than ever before. The total chemical products exported during 1923 exceeded £18,000,000, being £4,000,000 more than the previous year, whilst dyes and painters' colours were 33 per cent. higher at £4,700,000. Export trade is going ahead, and the attention of home-suppliers might, therefore, usefully be directed to the advantages and requirements of this branch of activity. Groups of chemicals at present exported include chiefly compounds of ammonia, sodium, and potassium, with sulphate of copper, insecticides of various descriptions, and acids such as sulphuric and tartaric. The largest demand is normally for ammonium sulphate, of which Spain and the Canary Islands take approximately £1,000,000 worth per annum. Present markets may, however, be developed and new areas entered by reference to the periodical reports issued by the Department of Overseas Trade.

Studying Local Conditions

The process of finding customers overseas is facilitated by the compilations of Commercial Secretaries and Trade Commissioners in various countries, which point out the correct procedure in establishing relationship with a prospective client, whose needs we are able to supply. Special conditions of language are applicable to all foreign markets, and business is aided enormously by correspondence and catalogues produced in the language of the buyer. This has been recently emphasised by the British Chamber of Commerce in Paris, which also points out that quotations to customers abroad should be made in their weights, measures, and currency. Reports from the Dominican Republic state that prices quoted f.o.b. London often kill all interest, and calculations in sterling frequently appear complicated to importers. South American countries are, however, willing to accept prices quoted in U.S.A. dollars.

Moreover, consideration must be given to prevailing local terms of credit, so that sufficient "days after sight" are allowed to enable the customer to effect payments. Study must be given to the market position in order that goods may be packed to suit climatic and physical conditions. Packing is important not only from the point of view of importers' requirements, but also in reducing costs to the British exporter. Mexico has a tariff which, with minor exceptions, is based upon the weight of goods and not upon import value, and therefore as light packing as possible should be used so that excessive duty may be avoided.

Determining an Inclusive Price

Quotation of a price which is inclusive of all costs up to and including delivery at the customer's door offers an advantage in service which the customer is bound to appreciate. Difficulties in connection with exact determination of this, though apparently overwhelming at first sight, become easier as they are approached. Mistakes may arise through different meanings being attached by various countries, but reference to the following chart of comparative quotations may clarify the position in illustrating that leading countries have much in common :—

UNITED KINGDOM.	FRANCE.	U.S.A.
F.O.B. (free on board)	F.O.B.	F.O.B. vessel
F.A.S. (free alongside ship)	F.A.S.	F.A.S. vessel
F.O.R. (free on rail)	Franco sur wagon	F.O.B.
Free delivered	Franco rendu	(not used)
C.I.F. (cost, insurance and freight)	C.I.F. ou C.A.F.	C.I.F.

Tariff Problems

Another important factor in chemical exports is the imposition and changes in tariffs effected by various countries. During the past year many European countries have levied export taxes, sur-taxes and restrictions even on their own exports, but these conditions do not obtain in the United Kingdom. Import tariffs have, moreover, been changed in many countries, as in India, which early last year fixed dyes at 15 per cent. duty, whilst Tunis last October reduced the duty on iodine to 150 francs per 100 kilos and now admits anthraquinone free. Examples where freedom of import is now permitted are Bulgaria and Argentina, which have removed the tariff applicable to chemical fertilisers. In U.S.A. early this year, under the flexible provisions of the 1922 Act, there have been applications for tariff changes in connection with 34 chemical commodities, and these are in process of investigation by the United States Tariff Commission (Chemical Division). For foreign countries up-to-date information regarding the tariff in operation may be obtained from the respective Consulates in this country.

Dumping duties are from time to time imposed by British Dominions, even against the United Kingdom, and under the Industries Preservation Act. Australia has this duty in operation against caustic soda from this country.

Packing Dangerous Chemicals

In regard to forms of packing laid down by Board of Trade regulations, the Merchant Shipping Acts also stipulate that shippers of dangerous chemicals shall mark the nature of the goods on the outside of the package and also give written notice of their character. It is unfortunate that difficulty arises in connection with the carriage of certain chemicals which have been known to cause accident, and shipowners advance as their reason that the cost of insurance of their vessels is increased so considerably as to minimise the freight return. Freights paid for carriage are often almost entirely dependent upon the question of insurance. Encouragement given by the Board of Trade in the 1923 Memorandum on Carriage of Explosives in Ships, however, has not served to eliminate the prejudice of carriers, and has given rise to much comment of late as to the acceptance of consignments by British shipping companies. Sulphuric acid, for instance, is generally carried on deck, and being contained in iron drums or carboys or in jars in wooden cases, often may not be accepted if weighing more than 3 cwt. gross, which possibly allows only about 1½ cwt. of acid net. Moreover, generally speaking, not more than 25 drums are taken on each vessel, which affects detrimentally the use of British shipping so

long as Continental companies are willing to carry with far less restrictions.

Bills of Lading

The documents connected with a shipment are of a technical nature and of course vary in detail as between shipping companies, although the principal clauses of all are alike. These will be familiar to exporters, but to the few not at present engaged in overseas trade their survey may be of more than passing interest.

The basis of a consignment is the Bill of Lading, which is a document wherein are set out at great length the rights and liabilities pertaining to the shipowners, but in addition there are implied warranties imposed by law that he shall provide a seaworthy ship and may not deviate from the normal route, unless exceptional circumstances arise. The Bill of Lading represents the contract of affreightment between consignor and carrier, by which the latter undertakes to deliver the specified goods under conditions named in the Bill to the person named or " to order." This is drawn up by the shipowner, and in the United Kingdom usually will not be handed over by him until receipt of the freight money, except in the case of firms having a continuous export account. Moreover, it is a receipt for the goods as evidence that these have been put over the ship's rail in apparent good order and condition.

In the first place, a temporary note may be handed to the consignor, such as a Dock Receipt, or in the case of water-borne traffic, a Mate's Receipt, which can be exchanged for the actual Bill—the latter bearing a 6d. embossed stamp. The Bill acts as a document of title to the goods and may be endorsed either specially to a named person or in blank to pass the ownership in the goods from hand to hand, even while these are in transit. As a safeguard to the exporter, the Bill is not, strictly speaking, a negotiable instrument, and therefore its possession does not give a legal title to the goods if conveyed through the medium of a thief. Bills are drawn in sets, and since trade is effected with countries whose regulations are often complicated and unsatisfactory the importance of clear and correct entries cannot be overrated.

Certificates of Origin

The last report of H.M. Trade Consul from Madrid is most insistent that particulars in the Bill of Lading must tally with those in the Certificate of Origin and other documents under penalty of cancellation of the certificate. In Spain the interpretation of a mistake is within the discretion of the Customs-House official, and moreover he has power to impose higher first column tariff-rates. Consequently the British shipping company or agent who is drawing up the Bill of Lading should be furnished by the United Kingdom exporter with an exact copy of the description of goods as contained in the Certificate of Origin in order that the ship's manifest and the Bill may agree, such conditions being of universal application.

As the basis of financing the shipment, a Bill of Lading establishes the importance of the Bill of Exchange or Draft, which, having been drawn up by the exporter, may either be discounted with his banker or forwarded with all necessary documents through the banker to obtain acceptance or payment of the Bill of Exchange by the importer or consignee, the latter being unable to obtain the goods from the ship until production of the Bill of Lading. Delay in forwarding the Bill of Lading holds up the goods upon arrival and renders the consignee liable to unnecessary expense for warehouse charges and port dues.

This is the cause of recent complaints from New Zealand, since cargo proceeding via Panama reaches the Dominion in advance of Bills of Lading despatched separately by mail. The course frequently adopted is that Bills are taken out by a London agent and afterwards forwarded to the manufacturer in the Midlands, who in turn may arrange with his banker to collect payment—all movements which require attention to reduce the aggravation of the time factor. The trouble is to some extent eliminated by the use of Consular Invoices, which are requisite in the case of exports to most countries and sometimes in addition to the certificate as to country of origin of the goods.

Importance of Accuracy

The supplement to Lloyd's Loading List—which should be in the hands of all exporters—shows that with the exception of European countries, practically all others require Consular Invoices, which are obtainable from the respective Consulates-General in this country. Most British Dominions stipulate for Certificates of Origin before granting preferential treatment, whilst a few countries, including Nicaragua and Chili, demand both Consular Invoice and a statement of origin. The greatest possible care is necessary in giving absolutely literal interpretation to regulations for making entries upon the Consular Invoices, and these vary with the legislation of the country of destination. Hayti, for example, has a law which authorises an additional duty of 20 per cent. for the slightest infraction of any instruction contained upon the invoices. Brazil imposes fines in such cases where shippers have scrawled one entry across two columns, even though this entry is applicable to both. There are doubtless reasons for such apparently trivial matters, and attention is worth while in export business.

Consular Invoices are generally drawn in sets of four in order that copies may be left with the appropriate Consul in the United Kingdom, and forwarded to the Custom House at port of destination, and yet another despatched in advance of shipment to the importer, who may thus arrange to unload goods immediately upon arrival. Insurance of the consignment may be effected with Lloyd's or with any reputable office undertaking marine insurance, and the policy may be transferred by endorsement to others, in the same manner as the Bill of Lading, except when forbidden by a clause in the policy itself.

Recovery under Marine Insurance

To recover under marine insurance, it is only necessary to have an insurable interest at the date of any loss or damage sustained by the goods. If shipments are large or continuous, a floating policy may be taken out, otherwise separate policies are needed for each shipment. Goods should be insured for the full c.i.f. value, with a strictly limited margin for anticipated profit, in order that the indemnity may prove to be complete should damage arise.

Other documents connected with the shipment sometimes include a Letter of Indemnity to the shipping agents or captain, where packages show signs of being chafed or broken when received on board ship. This will ensure a " clean " Bill of Lading and facilitate insurance. In practice, also, United Kingdom exports are entered in the Customs " Specifications " according to the applicable description in the " Official Export List."

Need for Specialised Knowledge

The exportation of chemicals is thus fraught with formalities and calls for specialised knowledge of shipping work, so that the oft-reiterated advice of the Department of Overseas Trade may be advanced as the soundest help to the would-be exporter, that his trouble will be saved many times over by the employment on commission of a ship-broker, more especially during the present time of shipping depression, when the latter is in a special position to put through business more economically than the outside person.

A Favourable Time

The lay-up of many ships to-day has altered the complexion of export work, so that the present time is exceedingly favourable to the development of overseas supplies Tremendous competition exists amongst shipping lines in order to obtain cargo, so that rates are being cut and recut in order to fill ship's space. Even the Conference Lines running to the East do not seem to be immune from this activity, as they face the competition of lines outside the agreement. Moreover, both Belgian and German companies are quoting lower freights, cheaper warehouse charges, and smaller dock dues, and it is known that some exporters are now shipping *via* Hamburg or Antwerp to their destinations.

Again, Port of London Authority dues, under the recent advance, are now about 100 per cent. higher than pre-war rates, and less expense may be incurred in lighterage and unloading at private docks.

Shipbrokers are enabled to take advantage of these factors in the situation, and their specialised knowledge will amply repay the commission charged. Even in normal times the shipbroker can offer important service in knowing what chemicals British lines will carry and what comparative facilities they offer, for no hard and fast rule applies. Under the prevailing absence of uniformity in regard to freight quotations, he can effect considerable saving in costs and in any case will supervise the freight payable, since this may be assessed in many ways, such as per lb., or per package, or according to ton weight or ton measurement.

Interpretation of Shipping Clauses

Legal decisions and interpretations of shipping clauses are of the utmost importance, and assistance in ascertaining the existence and effect of these is obtainable from British Chambers of Commerce in many foreign countries. In Chile it is held that F.A.S. for a particular port places liability upon both buyer and seller. In the case of nitrate sold under contract for delivery the seller is bound to place the cargo in a lighter alongside the vessel provided by the buyer without additional charge, but the buyer runs the risk of loss in craft from the moment the nitrate leaves the quayside. Here, again, such questions may be left in the hands of a reliable broker, whilst the chemical exporter confines his attention solely to his own side of the trade.

Difficulties arising from fluctuations in foreign exchange add complexity to export work, but may be overcome by inserting a fixed rate, for domestic currency as against sterling, upon the draft or bill of exchange.

Representation in Overseas Markets

It is, of course, a matter of the utmost importance to adopt the best method of distribution of goods destined for overseas markets, and it is nowadays becoming more generally recognised that there is no one right method applicable to all chemical products or even to the same class of chemicals in different markets. For some, it may be best to rely upon importing agents overseas, and for others upon travelling representatives taking indents in the foreign market. The appointment of agents with a view to intensive cultivation of markets is a matter of supreme importance, but rather beyond the scope of a firm about to enter exporting business, and therefore need not be subjected to minute investigation during the present consideration. Undoubtedly exporting, if taken up intelligently, can become a valuable adjunct to a reputable house, but it must constantly be borne in mind that British manufacturers who want export business have got to look for it. The effort to find it, if properly directed, is usually found to be worth while.

"Chemicals" in British Empire Trade

Review by Mr. F. T. T. Reynolds

"CHEMICALS." Vol. VII. in the Resources of the Empire Series. By A. W. Ashe and H. G. T. Boorman. London: Ernest Benn, Ltd. Pp. 208. 21s.

"CHEMICALS," the latest addition to the Resources of the Empire Series, is published at a very opportune moment. It is a work full of valuable matter of general interest, especially in the domain of commerce and of politics. Moreover, no student of the resources and possibilities of the British Commonwealth can afford to ignore such a valuable survey and compilation. It is worthy of a place in every well-equipped commercial library.

The foreword by the Prince of Wales is a good *hors-d'œuvre* to the substantial banquet that follows in the luminous and effective introductory articles by Sir Eric Geddes, Sir Max Muspratt, and Mr. R. G. Perry. These cover most of the aspects, but if an article had been included from the users' standpoint, and the merchants' views regarding importations and exportations had been embodied, the survey would have been still more comprehensive and its value further enhanced.

The position of the British chemical industry reflects infinite credit upon the manufacturers. In heavy chemicals our position is more than fully established—it is unassailable. Such concerns as Brunner, Mond and Co., Ltd., The United Alkali Co., Ltd., along with a large and increasingly successful number of other enterprising firms throughout the length and breadth of the land, make Great Britain not only self-contained and able to meet the requirements of the Empire but also able and ready to meet the principal requirements of most of the world. That enterprise is not relaxed is clearly shown by the determined effort of the Brunner Mond interest to solve at Billingham the synthetic ammonia problem. The previous achievements of this firm were a guarantee of success in this endeavour, and the Empire can breathe more freely now that it is known that this successful exploitation of the atmosphere will in the near future ensure freedom from dependence upon external resources for commodities essential in times of peace or war. This is a development of vital importance for the whole Empire.

Taken in conjunction with the great improvement in the production of British-made dyes—particularly, in relation to alizarines, synthetic indigo, vat dyes and a wide range of sulphur, direct, and basic colours—there is abundant ground for satisfaction. At the same time it is no use hiding the fact that under the operations of the Dyestuff Act prices current in Great Britain place users in many cases at a disadvantage as compared with their competitors abroad. The British Alizarine Co., at their fine and up-to-date works at Trafford Park, are producing an adequate range of alizarines of full standard strength at competitive prices and other makers are doing the same with a number of their specialities, but some articles such as synthetic indigo are far higher in price than they would be if there were a free and open market. Even in U.S.A., behind a very high tariff wall, the price is at least 50 per cent. lower than in Great Britain, although it ought to be producible here at quite as low a cost as in America.

The writers and compilers of the volume under notice have been very thorough and painstaking in most of their work, and the summaries of production, distribution, main uses of each product, proportions manufactured in the U.K., quantities imported and retained or re-exported are all of much interest and value.

No more convincing proof could be adduced than is given in the detailed particulars of what is produced and what is consumed throughout the Empire in Europe, Asia, Africa, America and Australasia. It is quite clear that rightly developed there exists within the bounds of the Empire, either actually or potentially, most of the raw materials required for the making of finished chemicals and dyestuffs. The main question is how to obtain and utilise supplies so abundantly and lavishly existing inside British territories. This can best be done on the basis of exchange of commodities, and in this direction the merchant trader has already rendered great assistance and is capable and equipped for still more effective service. The function of the merchant who seeks out supplies of wanted raw materials and acquires particulars of what is needed in exchange therefor fulfils the functions

that have largely operated to make Great Britain the chief trading country in the world. It is true that some of the great manufacturers have organised and developed their own importing and exporting machinery and have possibly benefited thereby. It is equally true that for the main body of manufacturers there are obvious and acknowledged advantages in utilising the channels and machinery developed by generations of overseas traders, who have eyes and ears in all parts of the world, who study and know the incidence of crops, available supplies, methods of transport, applicable rates of exchange, and many other valuable factors. Such traders by to-and-fro trading reduce to a minimum attendant risks.

When it is borne in mind that a wide variety of materials and commodities can be grouped into one and the same channel it will be seen that there must be greater advantage resulting from collective handling and financing than from each individual manufacturer incurring the cost and trouble of shipping only his own particular products with the probability that he cannot accept anything but cash in payment. In the past and during periods when British overseas trading has been most flourishing the merchants have been the main distributing medium, and probably one of the surest ways of ending the present depression and lack of employment would be to restore the former policy of helping rather than hindering and hampering the merchant importer and exporter who claims to be the most efficient, effective and economical medium for to and fro trading.

This mainly affects the Board of Trade, but the authors, Messrs. Ashe and Boorman, may perhaps bear the point in mind before subsequent editions of this valuable book are published and possibly they will appreciate attention being called to the somewhat inexplicable omission of bichromate of soda and chlorate of soda from their references to sodium compounds. This and a few other rather obvious omissions and slight errors only tend, however, to emphasise the general excellence and comprehensiveness of the book.

Parliament and Export Trade Development

The Part that Science Might Play

In the House of Commons on May 21 an interesting debate took place on a proposal to appoint a committee to consider the position of our export trade and the means to be taken to obtain the necessary markets. In the course of the debate Major A. G. Church, M.P., dealt with the part science might play, and some extracts are given below.

THE question of the supply of raw materials is one which must exercise the minds of every Member of this House. But there have been in the last few years substitutes discovered for many of the raw materials which are grown naturally. One can imagine what would happen to the silk industry of this country if we had to depend on overseas for our raw silk rather than on the scientific men who have discovered the process by which artificial silk can be made. One could go through the whole of the category of the various scientific discoveries in this country during the last 100 years, which have contributed so vastly to the national wealth, and which, if rightly used, could have contributed so materially to the welfare of the whole of the people of this country. I believe that if only the whole earth was brought under some scientific survey by the best scientific minds of all countries, not merely of this country, and if the financiers of the world also made up their minds to get back to their proper functions, and not to command industry, but to serve it as they originally did, that that would contribute to the happiness of the world, and the country would not be faced with the necessity of piling armaments upon armaments in the everlasting race for supremacy.

Discoveries that Affect Industry

During the last few weeks we have heard of a discovery by Mr. Grindell-Matthews. It is attributed to him that he has discovered a ray with extraordinary properties. The suggestion is that he can pass an intensive ray of electricity along a beam of light, using the beam of light as a conductor. I do not know whether he would agree with the suggestion that is made or not, but I understand he has patented his invention, and that there is some danger of the invention being taken up by another country. One is aghast at the idea whenever any invention of this kind is suggested in this country, or any other civilised country, that the first suggestion that is made by the thinkers—by the thinkers all over the world—when such a new instrument has been discovered, is not that of doing some good to the world, but that it may or should be used for destroying humanity, and destroying the best of humanity. All the way through one will find it is the same thing. The same process that will turn out poison gas will turn out the most beautiful dyes. Merely a slight change in the end of a series of processes will convert the one thing to something entirely different in its effects. Professor Soddy has rightly said that man, particularly civilised man, seems to have been using the discoveries of science which have given him such command over natural processes, not to build up the civilisation of the world and to add to its material and intellectual progress, but with the enthusiasm of a lunatic asylum to destroy and ruin it. That is essentially the case.

You have the Haber process of producing nitrogen from the air which would have supplied us with fertilisers for the whole of the world. Those fertilisers would give to us what we all require in this country—increased yield of our crops and reduced cost of production. But the first immediate purpose to which such scientific discovery was put was to supply explosives in order to blow men to bits. Something like 14,000,000 of civilised persons have either been blown to bits or rendered unfit for any further useful work for the community. We are facing now quite glibly the possibilities of a new war. So one can rejoice at the Motion which has been moved.

An impartial inquiry upon the matter would have to bring in the whole of the scientific men so that they might apply their minds as to what is best in the same way as you here have them apply their science to the arts of war. When we have that, there is no question about it, that civilised man will find a way out of the present *impasse*, different to this ceaseless competition in the markets of the world, and will realise that there is room for all of us.

Scientific Instruments

Only last year I spent a considerable time not only going through various universities on the Continent, but going amongst the firms that were making scientific instruments. I am interested in the subject, and in the production of scientific instruments. I remember in Vienna I went into the works of Reichardt's, the great optical manufacturers. I was examining and criticising one of the particular instruments which they produced—that is an epidiascope. In response to my observations the manger of the concern said, "It is true in that respect it is not all that it might be: it could be a much better instrument, but the trouble is that since the beginning of the War we have not been able to get your English craftsmen over here to work in our workshops, because we cannot afford to pay them the wages they want." He said that our best English craftsmen are going to America. On my return to this country I was happy to be present at a meeting of the British Association for the Advancement of Science, held at Liverpool, and I was examining there some of the scientific instruments which were being exhibited by various makers and agents.

Speaking to one of the agents I repeated to him the remark of the manager of the firm of Reichardt's in Vienna, and he said, "Well, there is no question about it that if the British manufacturers would only be content with a smaller margin of profit, if only they would have a little more courage and be prepared to develop a market which already is in existence, there is no reason at all why the British scientific instrument should not be the peer of any scientific instrument which is being produced in the whole world." He said it is true that in reality the German scientific instrument makers base their optical industry upon the elaborate researches of Abbé, and that is where the German manufacturer has scored. I say this without regard to Free Trade or Protectionist principles.

British manufacturers will not pay the same attention to a new discovery unless they think there is an enormous fortune

to be made immediately, and they have not displayed for the last 50 years the same courage in developing new industries as have been displayed by some of our foreign competitors. At the present time this country is not doing well from the point of view of scientific research, and as a matter of fact it is not really encouraging it. In 1917, during the War, a Committee of Inquiry considered the question of the application of science to the industries of this country, and eventually a Department of Scientific and Industrial Research was established to promote scientific research amongst the industries of this country. After some time a scheme was brought forward by which the Government itself was going to pay pound for pound to the manufacturers in certain industries to encourage them to take an interest in research. It was a pretty expensive experiment, as has been shown by the results of the quinquennial valuation of the work of the research associations, and why? Not that the research that has been done has not been of first class importance; not that if it had been done in America, or Austria or Germany it would not have commanded the respect and the attention of all the business men in those countries; it was not that at all, but merely that the British manufacturers will not take the least interest in research, with a few notable exceptions. They are amongst the best run industries in this country. They have not only been able to pay their workers well, but they have made a handsome margin of profits and have indulged in other schemes in South American railway companies out of the profits which they have made in this country.

Need for Research

The majority of the manufacturers in this country do not appreciate scientific brains, and they will not put people in control of their industries having any vast knowledge of science, and even a Government stands condemned for the type of director it has put on the British Dyestuffs Corporation which may, I hope, be remedied in the very near future. When these researches have been undertaken by the workers in the research associations most of them get pound for pound, and some get as much as £9; but in many cases firms that have only contributed £1 against the £9 contributed by the State do not want to continue to experiment and co-operate in this way, but it must be clearly understood that they cannot still proceed by their own unscientific rule-of-thumb methods and still command the markets of the world.

If there is one thing we have neglected in this country it is the application of the work that has been done. There are some people who look back to the 4½ years of war as a period of intense scientific research in this country. As a matter of fact, it was the worst period for the last 20 years from the point of view of the output of research. It was certainly the period when discoveries made in science during the previous 15 years were applied intensively for the protection of the country, and incidentally for the destruction of other countries.

One of the great drawbacks has been in the last few years, when the country owed a real debt of gratitude to the various scientific men who placed their services at the disposal of the State, without any hope of reward, and most of whom, since the war, have been most shabbily treated. I can think of one in particular. It was by the adoption of a suggestion of his, when he was honorary adviser to the Colonial Office, that British companies were enabled to control certain raw materials in British Guiana, which are absolutely essential for certain industries in this country. His advice was taken, but quite recently he was told that the Treasury did not think they could retain his services any longer, particularly now that, since he is getting an old man, he thought they might pay him something as a retainer. We have not, as a country, applied our scientific discoveries in a way which will improve not only our export trade, but our import trade. I have already suggested, for example, the possibility that we need not be so dependent upon oversea supplies of raw cotton. I am not suggesting that naturally-grown cotton is not the most economical source of such fibres for clothes at the present time, but I can envisage the time when we shall not need cotton plantations at all, but shall be able to synthetise fibres and make clothes from them.

One might go further and say that the time is not so very far distant when we shall be able to get, at any rate, as much nourishment, if we do not get as much physical enjoyment as we do at present, from our meals by using synthetic foods. It is a horrible thought, I agree, and it would not give us a great deal of physical satisfaction; but the time may come when man will not need the same amount of physical satisfaction as he does at the present time. In a number of directions this country is dependent upon our Overseas Dominions and upon foreign countries for supplies, as raw materials, of commodities which may very well, in the near future, be made synthetically. The history of the dyestuffs industry in this country is a tragedy of lost opportunities. We have tried our utmost in the last few years to get back our old markets in dyes. It is true that we have succeeded in this country in producing a large number of dyes, and now the whole world can supply such quantities of dyestuffs that the world could be overstocked with them.

There is another aspect of the export trade which has not been touched upon. I do not want to enlarge upon it, but we are thinking a great deal in these days about the markets which we have inevitably lost in certain directions because the peoples concerned are themselves manufacturing on their own account, and, as they have the necessary raw materials in abundance at their very doors, we quite obviously cannot face competition of that kind. It is doubtful whether it would be a good thing for this country to attempt to compete unduly in certain natural markets, such as the Bombay market in the case of cotton goods; but there are still vast tracts in thickly populated countries where there is a tremendous avenue for our export trade, if only the populations of those countries increased their needs.

If there is one thing above all others which increases the needs of any population, it is the spread and growth of education. As man's education improves, so do his needs increase, and this fact should provide any Committee of Inquiry with food for thought. Think what a thoroughly well educated Russia would mean from the point of view of the export trade of this country; but it will take some years for the Russian people to develop the needs that have already been developed by the people of this country. One could go on applying that to various other countries, where the standard of civilisation is a poor one, owing entirely to the want of any proper system of education. In other words, it would pay this country to spread propaganda of an essentially peaceful kind to the effect that all peoples on earth should be thoroughly well educated. It would be sound economy from this country's point of view, and would give this country's export trade, as far as one can gather, the impetus that it needs.

Opening Up Trade with Australia

DURING the course of the Empire Exhibition a Congress of Commercial Travellers' Organisations throughout the Empire will take place in London. Representatives will be present from Canada, Australia, South Africa, and New Zealand. The object of the Congress is to confer regarding many interests (such as transportation, commercial travellers' privileges, etc.), which the Associations have in common, and concessions regarding same, benefit funds, residential clubs, and the protection and advancement of the interests of commercial travellers generally. A leading feature of the Congress will be the promotion of trade within the Empire.

In this respect, Mr. James Davies, General Secretary of the United Commercial Travellers' Association of Australia, who will be one of the delegates from Australia, wishes to get into touch with commercial and manufacturing interests desirous of opening up trade relations with that Dominion. The Australian C.T. Association is a powerful body, with a chain of residential club-houses throughout the Commonwealth, and makes a special function of arranging for representation there for overseas firms. The Australian body has established London headquarters by means of an elaborately furnished reception room in the Australian Pavilion at the Empire Exhibition at Wembley, where Mr. Davies can be consulted after his arrival in London from Australia on July 3. Mr. Davies is intimately conversant with trade conditions in Australia and will be glad to tender information and advice to firms desirous of obtaining same. The Empire Congress of Commercial Travellers' Organisations has been convened by the Commercial Travellers' Association of Great Britain and Ireland, whose Secretary is Mr. F. Coysh, 34, Red Lion Square, W.C.1, to whom inquiries may be addressed in advance concerning Mr. Davies's movements.

Reviews

LUNGE & KEANE'S TECHNICAL METHODS OF CHEMICAL ANALYSIS. Volume I. Second Edition. Edited by C. A. KEANE and P. C. L. THORNE. London: Gurney and Jackson. Pp. 772. 63s.

Although this manual was originally written in German, it has been influenced to such an extent by British works practice and has been so thoroughly revised by Dr. Keane and his collaborators, that it is expressive rather of British than Continental practice. The present edition has been rewritten by C. A. Keane, H. J. S. Sand, J. S. G. Thomas, G. Nevill Huntly, J. T. Dunn and H. E. Williams. Apart from the general methods, it deals with gas and fuel analysis, the analysis of sulphuric, sulphurous, nitric, and hydrochloric acids, soda, chlorine, cyanogen compounds, incidental materials and electrometric titration. The latter plays at present a very small *rôle* and is being adopted only gradually on account of the price and fragility of the apparatus and complicated nature of the methods. However, if followed, it would eliminate a fruitful source of commercial disputes, and on that account Dr. Keane and Mr. Thorne deserve great credit for taking time by the forelock in including it. The popularity of the first edition of the book is significant for the triumph of scientific methods in British practice of technical analysis. The keen competition with which works in this country have to contend demands accurate analytical methods, a need which will derive much help from this volume. There is frequently a choice of methods available for any desired accuracy and the corresponding expenditure of time. Some of the apparatus mentioned are perhaps a little complicated and could only be obtained in London—and there with difficulty—but for a regular series of analyses as is necessary in any works this would not prove a serious drawback. There are numerous tables of useful data, such as a standard scale of temperatures, etc. Taken all round it is a useful book, which should find a place in every analytical laboratory.

S. P. S.

THE GAS ENGINEERS' COMPENDIUM. London: Ernest Benn, Ltd. Pp. 292. 32s. 6d. net.

In issuing this volume the publishers announce that hitherto no modern reference book of the "pocket" type has been available for gas engineers, and that the present volume—the information for which has been put together by experts—is the outcome of the many suggestions they have received that a desk companion for gas engineers would meet a long-felt want. We must state at the outset that the publishers, as a result of their decision to act on the recommendations made to them, have produced something very remote from a "pocket-book" as the term is used in its correct sense, for here we have a remarkably well got-up and bulky volume with crown 4to pages which would make a handsome ornament on any book-shelf. The gas engineer is essentially one of those unfortunate modern hybrids, who, if he is to be fully equipped for his profession, must have a fairly close knowledge of quite a number of applied sciences as well as more than a nodding acquaintance with such things as pure mathematics and chemistry. He cannot possibly expect to carry his data, statistics, and working rules in his head. His need of a reference book is, accordingly, too self-evident to require emphasising. From a careful survey of the present volume one gains the impression that a good many minds must have been called into use in getting the information together, for no phase of the whole subject seems to have been overlooked. Details are given which not only indicate the important role which the gas industry plays in this and other countries, but there is a good deal of useful information about the legislation controlling gas undertakings, the production, export, etc., of all those substances associated with coal carbonisation, and the technical processes involved in the production of gas and the working up of by-products.

In addition to this one finds a complete and well-arranged series of tabulated matter which designers and draughtsmen are daily in need of, while the works' chemist is also provided for. One feels, in fact, that the main difficulty of the compilers must have been not what to put in but what to leave out.

The book is one which, though specifically written for gas engineers, can be strongly recommended to all those who to-day come within the definition of a chemical engineer.

C. A.

THE PRINCIPLES OF ELECTROPLATING AND ELECTROFORMING (ELECTROTYPING). By William Blum and George B. Hogaboom. London: McGraw Hill Publishing Co., Ltd. Pp. 356. 20s.

The art of electroplating has, in a great measure, been carried on by empirical methods assisted by little of what is known as applied research in the strict sense. Latterly, however, a revival in interest has taken place, both in England and in America, and much is to be hoped for from the publication of the results which are being obtained.

The authors of this book are attached to the United States Bureau of Standards, a fact which hall-marks the volume at once, but which leads one to expect rather more than one actually finds. It is stated that the purpose of the book is not so much to present the results of research as to assist in applying the conclusions arrived at at various institutions, and to obtain a more general recognition and application of the established and fundamental principles of the related sciences. The consequence is that seven chapters are devoted to explanations of elementary principles of chemistry, physics, analysis, etc., which, for the earnest worker, are better and more fully explained in treatises devoted to these particular subjects. The remaining fourteen chapters may be divided into two portions—the first, of five sections, dealing with the elements of electro-deposition, and the necessary equipment, the second, of nine sections, treating of the deposition of the metals which are used in commercial practice. Some of the methods are novel, but others which are well known here are omitted. For instance, no reference has been found to the process for striking a conducting coat of silver on a wax or guttapercha mould by the reducing action of phosphorus in carbon bisulphide solution on an alcoholic solution of silver nitrate. The authors have considered, rightly, that a mere cataloguing of the various baths used by platers is not so useful as a consideration of the main reactions which may occur in the solutions generally employed. In this direction the book is especially instructive.

W. A. C. N.

OILS, FATS, WAXES AND RESINS. (The Resources of the Empire Series.) By E. R. BOLTON, F.I.C., and R. G. PELLY, F.I.C. Ernest Benn, Ltd. 1924. Pp. 275. 21s. net.

This is the ninth volume of a series of twelve dealing with the principal industries of the British Empire. The special introductory review by the Chairman of the African and Eastern Trade Corporation hints at the weaving of fascinating stories of commercial enterprise, of the development of acute analyses of trade currents and undercurrents revealing many unsuspected features of Empire trade and throwing a new light on many pressing problems. These anticipations are admirably fulfilled. Throughout the volume a special study has been made of undeveloped resources of the Empire, and this feature is marked by a restraint and evenness of judgment which add greatly to its value.

Localised problems of cultivation, harvesting, and transport are discussed at length and illuminating comments and suggestions stand out to stamp the book as unique in its general interest and in its service to the Empire industries depending upon the production of oil-seeds. Animal oils and fats and the resins receive ample consideration in smaller sections of the volume, and a special section by Mr. H. Moore deals with the production and consumption of lubricating preparations of mineral origin. A very useful list of institutions from which information may be obtained, and a selected bibliography form an acceptable addition to the general chapters. It is to be hoped that new and enlarged editions will appear at intervals to preserve the volume as an accessible and up-to-date standard work of reference.

WM. W. MYDDLETON.

THE ELECTRON IN CHEMISTRY. By Sir J. J. Thomson, O.M., F.R.S. London: Chapman and Hall, Ltd. Pp. 144. 10s. 6d.

The authorship of this little book is sufficient recommendation in itself, and it only remains to add that it is based on five lectures delivered before the Franklin Institute at Philadelphia in 1923. The subject is reviewed in its entirety, covering theories of valency, chemical constitution, electrolytic dissociation, solids, surface tension, etc., and the treatment is such as to appeal to the serious student or the practising chemist who wishes to keep abreast with the latest developments in the fundamental theory of the science.

D

"The Outlook in Chemistry"

The Trueman Wood Lecture by Sir William Pope

Sir William J. Pope, F.R.S., the Trueman Wood Lecturer for 1924, took as his subject "The Outlook in Chemistry" and the lecture was delivered at the Royal Society of Arts on Wednesday, May 21. The first instalment of the lecture was published last week; the concluding portion is given below.

Recent Work on Radioactivity

It would be impossible in the limited time now available to submit any adequate picture of the far-reaching deductions from recent work on radioactivity; one or two points may, however, be emphasised. The Moseley atomic number shows that 92 elements should exist and 87 of these are now known, five being left to be discovered; it indicates that the atomic weights of all the elements should be whole numbers. Rutherford showed that the atomic nucleus, which gives the atomic weight as the number of units of positive electricity included within it, is composed of ponderable positive particles and practically non-ponderable negative particles of electricity, the difference being the atomic number of Moseley; it appears, however, that the atomic nucleus of any particular element can preserve its identity, from the purely chemical point of view, if containing one or more positive and the same number of negative units of electricity less.

The positive charge, the Moseley atomic number, would be thus left unaltered and consequently the identity of the element, for purposes of chemical change, should remain unchanged. In accordance with this Aston has proved in a large number of cases that the chemical elements are mixtures of atoms of different nuclear composition, although identical as regards the number of negative electrons which compose the outer or chemically active atomic domain. Elements which differ to the extent just indicated in nuclear composition, but which are identical in the number of electrons present in the external domain, have been termed isotopes; it is now known that the atomic weights of each variety of any element appear as whole numbers when referred to a particular unit. For a reason which is not yet elucidated, but which is certainly of significance in connection with our knowledge of the relation between matter and energy, the unit value for the atomic weight of hydrogen has to be selected as 1.008; this unit chosen, the atomic weights of the isotopes of all the elements appear as whole numbers. The empirical deduction of Prout of a century earlier has thus been completely justified. Again, the purely empirical deduction by Mendeléef of the so-called periodic classification of the elements, which has exercised enormous influence in the development of inorganic chemistry, has found complete theoretical justification in the arrangement of the elements in sets of eight in accordance with the system of atomic numbers introduced by Moseley. The deductions drawn by Lavoisier about 1775, which indicated the existence of chemical elements and stated the law of conservation of matter, both find theoretical justification in modern conclusions; each chemical element is characterised by the Moseley atomic number, and the law of conservation of matter stands subject to the slight adjustment involved in the attribution of an atomic weight of 1.008 to hydrogen. Lastly, the atomic theory of Dalton has passed from the stage of being merely a useful hypothesis to that of stating an actual condition of affairs; it is safe to assert that never again in the history of science will the existence of atoms of the elements be seriously challenged.

So far we are on undebatable ground, but much more still disputed territory is in sight which will undoubtedly be secured in the very near future. The nature of chemical combination has been long in dispute; the Frankland doctrine of valency has been very fertile as leading to a classification of types of reaction and to a very perfect system of indexing the composition and constitution of chemical compounds. It seems likely that the Rutherford conception of atomic structure, interpreted quantitatively by Bohr and his co-workers, and adapted to chemical mechanisms by men of the Langmuir and Millikan school, will ultimately provide a satisfactory solution of many of the baffling problems now presented by the question of atomic valency.

Molecular Constitution

Yet another remarkable chapter has been recently opened in connection with the confirmation by contemporary physicists of the singular accuracy of the manner in which chemists long before had interpreted the observed facts relating to molecular constitution. Frankland's doctrine of valency enabled Kekulé about 1858 to develop the theory of the molecular constitution of chemical compounds, and later generations of chemists have brought to a great state of perfection the methods for ascertaining the manner in which the component atoms of an organic molecule are joined together. The precision of the synthetic methods of organic chemistry and the striking facts of stereochemistry made it certain that the so-called structural formulæ run closely parallel to the actual arrangement of atoms in the chemical molecule; at the same time, no independent or more direct confirmation of the substantial correctness of constitutional formulæ was until quite recently forthcoming.

The purely geometrical investigations of Bravais, extended and completed by Sohncke, Schönflies and Barlow, have long since shown that all properties of crystals are consonant with the supposition that crystal structures consist of a regular repetition in space of the molecular units, and consequently also of the atoms which compose the molecule; any particular plane section of a crystal is thus to be regarded as having a definite reticulated pattern formed by the geometrically regular repetition of component atoms in the plane. It has also been long known that light is diffracted in accordance with well-understood laws from gratings ruled with a large number, say one hundred thousand to the inch, of fine lines. The reticulated pattern of a crystal surface is, of course, far more minute than corresponds to the dimensions just stated, and X-rays are of wave-lengths of the order of one-ten-thousandth of those of visible light. It thus occurred to Laue in 1912 that X-rays should be diffracted from a reticulated crystal surface in the same way that visible light is diffracted by a grating; he showed this to be the case, and shortly afterwards Bragg founded upon this observation a method for determining the atomic spacings in a crystal by observation of the manner in which X-rays are diffracted from the crystal. Debye and Scherrer showed a little later that massive crystals are unnecessary for the application of the Bragg method, but that finely powdered crystalline material can also be used and, in fact, the study of X-ray diffraction from particles of colloidal gold in aqueous suspension has proved that the colloidal particles of this element are crystalline.

The Bragg method has been intensively applied during the last few years and has demonstrated that the constitutional formulæ deduced in an entirely different fashion by the chemist are substantially correct representations of the actual manner in which the atoms are arranged in the chemical molecule.

This necessarily very abbreviated summary of the most important directions of recent progress in physics in so far as they influence chemistry will suffice to prove a quite simple thesis. Whilst the chemist at the end of last century had laid certain theoretical foundations to his science, more particularly those connected with the atomic theory, the doctrine of valency, the Mendeléef classification of the elements, and the vast network of organic chemistry which culminates in the determination of molecular constitution—all these achievements remained as theories or even in part as mere hypotheses until the sudden development of physics during the last twenty years or so transformed them into actual statements of fact. The history of science has never before had to record so dramatic and far-reaching a broadening of the horizon as that which has so recently unified chemistry and physics.

It is doubtful whether the importance of the unifying process which has been carried out so rapidly has been sufficiently realised by the majority of those interested in physico-chemical science, and attention may be directed to one aspect of the question which appears to be relevant.

Unchanging Teaching Methods

Whilst the present generation of students is acquiring an outlook very different from that prevalent a few decades ago,

our general organisation of teaching methods remains unchanged. The student commences his training in natural philosophy by attending separate courses in inorganic and organic chemistry and in general physics, including heat, electricity and magnetism. But the reason for this early differentiation has now entirely vanished, if indeed it ever really existed; all these subjects have the same basis, namely the electronic constitution of matter and energy, and it would seem more rational for the student of natural philosophy to commence his training by a general course for the purpose of elucidating the manner in which all these specialised sections of the one large subject fit into the one great scheme. Students have frequently asked me how to reconcile the tenacity with which a complex molecule of an organic compound retains the perfectly definite arrangement of its component atoms with the view that an atom itself is but a minute nucleus surrounded by a large planetary system of particles of negative electricity in rapid gyration; there is indeed a striking contrast between the rigidity of molecular structure evinced by organic compounds and the apparently flimsy nature of the rotating sub-atomic units from which the whole wonderful edifice is built up. Our teaching methods require considerable adjustment to make them fit the exigencies of the modern scientific outlook.

Probably I have said sufficient to make it clear that the outlook in chemistry is far broader than it was twenty-five years ago; we understand now the meaning of much that had been painfully deduced by generations of careful observers of experimental facts. We may now proceed to inquire what we see in front of us as the result of the wider outlook.

Future Sources of Energy

All inquiring minds in science are accustomed to peer into the future in an attempt to discern the directions in which progress is possible; hundreds of imaginative writers have tried to foretell the effects upon human life which will accrue from coming advances in science. In this connection I desire to submit one ruling principle—a principle which is admirably exemplified by the directions of progress during the present century and which appears to be as yet but ill recognised. The principle is that all scientific prophecy which goes outside what will obviously and logically result from the normal and unsensational development of the existing scientific position is necessarily false. No one in 1900 ever conceived anything so sublime and yet so fantastic as the achievements of the past quarter of a century.

Fears are often expressed that humanity is being impoverished and that posterity will be embarrassed by the rapidity with which our coal and petroleum resources are being consumed; but it is reasonable to presume that long before these potential supplies of energy have disappeared their applications will have become obsolete. Whilst every motive exists for employing our present sources of energy with the maximum efficiency, we may safely leave posterity to look after itself with the aid of the scientific heritage with which it will be endowed. The desire to leave coal and petroleum for our successors to consume shows benevolence, but appears no more rational than the action of our ancestors in planting England with oaks after the Napoleonic wars so that we might not lack material for the building of battleships.

But whilst we cannot see far into the scientific future, we can safely foretell certain immediate consequences of the position which chemical and physical science has so lately attained; we are confident that the period, 1925–1950, will be as prolific of discoveries previously unimagined as was the period 1900–1924, and it is futile even to speculate concerning the entirely novel conceptions and discoveries which the next quarter of a century will bring in natural philosophy.

It may be taken for granted that the Bragg method for determining crystal structure, which is still in its infancy and not so far capable of dealing directly with the lighter elements, will provide a means for locating accurately all the atoms present in any molecular complex, either inorganic or organic. This must lead to a great development in our knowledge of chemical structure and should enable the relations between chemical constitution and physical properties, many of which have merely been studied empirically up to the present, to be discerned and stated with precision. Thus, it may be expected that the exact relation between the molecular configuration of an optically active substance and its molecular rotatory power will be ascertained.

Points of Detail Still Obscure

Our present knowledge of atomic constitution, with its inevitable developments and its applications to the elucidation of valency, and the elaboration of purely physical methods for determining molecular constitution, may be expected to throw light on an almost infinite number of points of detail in organic chemistry which are still obscure. We may expect to learn the cause of the great stability of the benzene ring, the basic principle underlying the tautomerism exhibited by ethyl acetoacetate and its analogues, the origin of colour in the quinones and why copper of atomic number 29 refuses to form organo-metallic compounds whilst its followers in the series of the elements, namely, zinc, gallium, germanium, arsenic, selenium and bromine, of atomic numbers 30 to 35, all combine with methyl radicles. A quantitative explanation of the energy changes which accompany chemical reactions is to be anticipated. An exposure of the mechanism attending chemical changes in general and of catalytic reactions in particular should be forthcoming; the importance of this latter in connection with the chemical operations performed by living matter, as bearing upon the utilisation of energy at low potentials for synthetic purposes, can hardly be exaggerated.

A myriad of other obscure questions, which the chemist has already carried nearly as far as his classical experimental methods will permit but which are obviously open to further elucidation in the light of modern methods, will suggest themselves to the intelligent student of chemistry. A danger, indeed, exists that we may encroach on the domain of the imaginative writer of fiction by speculating on the new chemistry which is foreshadowed by Rutherford's transmutation of the elements by the *a*-particle bombardment of the atomic nuclei and on the complications which will ensue when the several isotopes of many of the elements are available in quantity; although it is often stated that the isotopic varieties of an element will never be isolated in such quantities as are necessary for chemical work, yet it is difficult to believe that this state of affairs will long persist. It may be taken for granted that in due course the isotopic chlorines of atomic weights, 35 and 37, will be available in quantity.

Specialisation and Team Work

Up to the present I have only discussed the change in the chemical outlook which has resulted from the superb achievements of modern physics, but another and very dissimilar factor has been simultaneously operative. Although the theoretical basis of modern chemistry is of a comparatively simple character, the mass of exact and detailed experimental material laboriously collected and recorded during the last century has made every chemist a specialist; each had ultimately been forced to settle down as a cultivator of one minute patch of the vast chemical domain. A tendency towards individualism has thus been fostered. If we look around, however, we see that a tendency in a contrary direction has become operative, namely, towards combined action for the purpose of producing a definite mass effect. The coal-tar colour industry furnishes an illuminating example of this effect; for many years past a large community of most competent chemical investigators have devoted themselves to the exploitation of the subject of dyestuffs in conjunction with similar bodies of industrial and commercial experts. It cannot be denied that this co-operative effort has produced remarkable results; not only has it, in a comparatively brief span of years, succeeded in dominating one of the oldest and most conservative industries in the world, but it has extended its influence in many other directions. The coal-tar colour industry has, in fact, made itself essential in the production of materials necessary to many other industries, such as those of pharmacy and photography; whilst avowedly commercial in its aims, it has contributed much to the purely scientific development of organic chemistry.

Something very similar has taken place in the electrical industries. Certain of the great research laboratories which form part of a number of electrical firms have made most valuable contributions to the science of pure physics; they can afford a huge expenditure of money for scientific equipment and can attract the assistance of real leaders in contemporary science.

In chemistry itself the advantages of collective effort towards the extension of industrial efficiency is not confined to the coal-tar colour industry; it is seen in the gas industry

and in the novel institution, fostered by experience gained during the war, of research establishments each devoted to the development of some specific large branch of manufacturing industry. But if chemical science is to carry its full responsibility in connection with the amelioration of the conditions of life, far more must be done to ensure efficient team work in developing the applications of chemistry to human interests.

Some Examples

A few examples will illustrate this. The spirochaete of syphilis is susceptible to treatment by certain organic arsenic compounds; knowing this, Ehrlich conceived the idea of studying the therapeutic action of a long series of such compounds for the purpose of selecting the most suitable for the treatment of this disease. He ultimately decided that one particular substance, the so-called 606, was the most satisfactory curative agent from amongst the many which passed through his hands. Since Ehrlich's day other organic arsenic compounds have been introduced for the treatment of this particular disease, but all present certain disadvantages and possess certain limitations in efficiency. No thinking person can doubt that if 10,000 compounds, all variously toxic to the spirochaete, had been studied, one immeasurably superior to all the others as a curative agent would have been found; this could have been easily done by team work, and such a discovery would have repaid thousands of fold the original outlay on experimental work. A similar tale has to be told concerning sleeping sickness; Bayer 205 seems to be useful, but something much better would certainly have resulted from the examination of some scores of thousands of chemical substances. No such success can be claimed in connection with the foot and mouth disease, which has cost the country many millions of pounds during the last year, because team action has not been enlisted, and consequently absolutely nothing is available for the treatment of this particular malady. A pressing need exists in this country for an organisation with the duty of drawing up schemes for the preparation of long series of related compounds of possible therapeutic value, making the substances and subjecting them to pharmacological investigation.

Let us take another instance. The common and the noble metals have been for centuries the materials of staple industries in many parts of the world; no one metal finds industrial applications in a state of purity, but all are used as alloys with other metals. This being the case, and since none of the alloys in general use approaches perfection, it would have been anticipated that by this time we should have been in possession of an elaborate scheme of experimental data which would provide exact information concerning the properties of every possible admixture of one particular metal with one of several other elements; the scheme would of course be a very complicated one, but not nearly so complicated nor as difficult and costly to work out as our present system of organic chemistry.

In spite of much pioneer work by Sorby, Heycock and Neville and many others, no such scheme has been evolved; the National Physical Laboratory is now just initiating an experimental investigation for the purpose of studying the alloys of pure iron and chromium, and this, if successful, will be the first occasion on which the systematic study of alloys of pure iron with another pure metal has been undertaken.

Much more might be said on the need for a broader outlook on the applications of chemistry to other sciences and to the arts and on the necessity for the detailed working out of large and comprehensive plans, involving much experimental work of a rather routine or repetitive nature, so as to provide the vast amount of precise data always essential to any application of chemistry to technical ends. Many cases in which valuable results would be thus achieved will occur to anyone familiar with chemical science and acquainted with its bearings upon other branches of knowledge.

Metallurgical Developments in Peru

STEPS are being taken to introduce methods to refine metals in Peru instead of continuing the practice of spending large amounts of money abroad for this work. Accordingly a decree has been issued appointing Mr. G. D. Zevallos, a member of the Cuerpo de Ingenieros de Minas, to study the methods employed in the United States, with the object of establishing in Peru plants to use similar processes.

Scientific Instruments Industry

Sir Charles Parsons at the Institute of Physics

AT the annual meeting of the Institute of Physics held on Monday in the rooms of the Royal Society at Burlington House, Sir Charles Parsons was re-elected president for the ensuing year.

Research and Invention

Discussing the mental attitude and method of the really useful inventor, the President, in the course of his address, said that the skilled inventor marshalled his ideas and, following the procedure of nature, put them through a process of "natural selection," with the object of obtaining the fittest solution of his problem. The testing out of any discovery or invention was probably in general the most difficult and the most important part of the work, a work in which a knowledge of physics was of inestimable value. In most cases it was a matter of hard work and patience. Invention was, in almost all cases, the result of the work of many persons, and very rarely that of one man. The increased complexity and refinement in all branches of research in applied mathematics, physics, astronomy, engineering, chemistry, textiles, ceramics, and glass-making, involved more capital in the shape of trained brains and apparatus of all kinds. In other words, more money was required.

There had been a slow but universal tendency, even in works of moderate size, to establish research departments under, and in close collaboration with, the management. Care, however, must be taken that there was no loss of collaboration between the management and the research workers, and to this end it was desirable that the heads themselves should have some training in physics, or evince a due appreciation of the advantages to be derived from research.

Dependence upon Exports

After illustrating some of these points by reference to the steam turbine, the President made some remarks concerning the scientific instrument industry. He said that industries in England depended largely upon exports, and our unique position as the workshop of the world had been modified, and powerful rivals had sprung up. This change seemed to be most noticeable in some of the so-called "key" industries, and perhaps especially so in the scientific instrument industry. It was also to be traced in the production of a number of materials of importance to the scientific professions and used in laboratories and scientific workshops. The scientific instrument industry was relatively a small one, the nominal capital involved being about £2,000,000, or, at present market prices, considerably less. Though it was scheduled for protection as a "key" industry, beyond the placing of an import tariff of 33⅓ per cent. in respect of such goods, the industry had, so far as he was aware, received no financial help from the State, except the Government's contribution to research. Moreover, the Dominions, in some instances, had of late been purchasing directly from foreign countries.

Danger of Buying from Abroad

For a long time before the war there had arisen a practice among physicists and others of equipping their laboratories with instruments, materials, and chemicals chiefly imported from abroad, with the result that not only was the home industry impoverished because of lack of orders, but the industry was, to some extent, put out of touch with the requirements of the home market. It thus became less capable of keeping abreast of the most recent advances, and of taking a lead by anticipating the wishes and aspirations of physicists and other scientific workers. As a result the home industry grew less able to compete with the flourishing industrial concerns in foreign countries not so handicapped. The physicists alleged that because of their limited funds they were obliged to buy in the cheapest market. In spite of the higher cost of British labour, it was certain, if the home manufacturers had received more encouragement and more sympathetic help from the buyer, that under these more favourable conditions they would have been able to provide themselves with better manufacturing equipment, and a more skilled staff, and to have manufactured as cheaply and as well as the foreigner under a level exchange.

The remedy was to be found in more sympathy between the buyer and the manufacturer and more combination and a less

exclusive and self-regarding individualism among the manufacturers. Each firm should concentrate on the few articles that were best suited to its equipment and the abilities of its staff, and develop these with vigour, and, in the case of some articles in large demand, adopt mass production. To the scientific users he would also make an appeal. It was not so widely known as it should be, even among British scientific workers, that if, in some classes, British scientific instruments might fall somewhat below the standard of foreign instruments, in others they were unquestionably superior.

Samples from Germany

Concessions Secured by the British Chemical and Dyestuffs Traders

THE British Chemical and Dyestuffs Traders' Association announce that their members have experienced considerable difficulty through Customs detaining as liable to German (Reparation Recovery) Act levy *bona fide* trade samples for which no payment was made to the German exporter. At one time all such samples were liable to this levy. The Association submitted to the Board of Trade that the amount payable on such imports from Germany was negligible, and that the hold-up of the packages was causing inconvenience. Acting on this, the Board of Trade issued an Order (G.R.R. No. 1) exempting small samples so long as there was " not more than one of a kind." Put into operation this Order was found to be useless and confusing, and the Association made further efforts to get the Department to put the matter on a common sense basis, pointing out that the " one of a kind only " rule was capable of wide interpretation. At that time the Association dealt with cases where members were asked to pay a few pence as the amount of the levy on samples because " there was more than one of a kind." The Association now state that the following letter has been received from the Board of Trade :—

" With reference to your letter respecting the difficulty your members are experiencing through trade samples being held up by Customs for payment of the Reparation levy, I am directed to transmit herewith copy of an Order they have recently made exempting small consignments from payment of the levy under the G.R.R. Act. The Board presume that such samples as those referred to in your letter will come within the provisions of this Order, and will therefore on and after the 18th instant be exempt from payment of any levy."

THE GERMAN REPARATION (RECOVERY) NO. 2 ORDER, 1924, DATED MAY 6, MADE BY THE BOARD OF TRADE UNDER THE G.R.R. ACT, 1921 (11 AND 12, GEO. 5) :—

> Any article of the following description shall be exempt from the provisions of the said Act, that is to say, any article imported into Great Britain or Northern Ireland on or after May 18, 1924, in respect of which it is proved to the satisfaction of the Commissioners of Customs and Excise that :—
>
> (*a*) The proportion of the value of the said article payable under the said Act to the said Commissioners does not exceed 2s., and
>
> (*b*) The said article is not included in the same consignment or order with other goods of such value that the sum payable to the said Commissioners under the Act in respect of all goods so included exceeds 2s.

Paragraph (*a*) permits the free entry and exemption from the levy of goods (not necessarily samples) of a value not exceeding £2. Paragraph (*b*) provides that such goods must not form part of any other consignment. It is hoped members will now be freed from the annoyance and inconvenience that often caused loss of business in the past when Customs were in the habit of holding such samples and quibbling about payment of a few pence.

Safeguarding Act Difficulties

The Association have recently dealt with a number of cases of undue delay by Customs in clearing goods that had to be sampled and tested under this Act. The chief complaint is that, from experience, well over 60 per cent. of consignments held up for test are ultimately released free, but only after the goods have been detained for a week or more. Customs will persist in holding, sampling and testing large consignments of such materials as Glauber's and Epsom salts, ammonium chloride, etc., that are imported regularly at the same ports. They state they are not allowed any discretion in the matter and as these products (and hundreds of others) are in the Key List marked " R " (pure grade only)they have to satisfy themselves that 100 tons of material packed in bags is not of " R " grade as used for laboratory work.

Directly a consignment is held up the importer (or his agent) should request the Customs dock officer to inspect the goods and at the inspection hand him samples drawn in his presence. It should be borne in mind that it is for the importer to do this work. Customs do not draw samples. Members experiencing trouble of this kind are asked to put the matter in the hands of the Association.

Club and Federal Council

To the Editor of THE CHEMICAL AGE.

SIR,—After reading the comments and correspondence on this subject, I cannot feel any regret at having drawn attention to the position. From what I have heard, I believe the discussion has had a good effect in showing the need of proceeding on strict business lines in such matters. I do not think among members of the Club there is any feeling against the Federal Council, one of whose members we are pleased to have as President. The only difficulty in the matter of joint action is that nobody seems to know what the constitution of the Federal Council is or how exactly its affairs are managed. In the case of the Club and other chemical organisations these points are embodied in their charter or rules of membership.—Yours, etc.

May 27, 1924. A MEMBER OF THE CLUB.

Fire-proofing and Timber Protection

To the Editor of THE CHEMICAL AGE.

SIR,—I am anxious to obtain the rights for this country and also, if possible, for the United States, of a patent process for fire-proofing and generally preserving timber against fungi attack, and also any patent process for treating marine piling timbers to insure absolute immunity from sea worms and marine borers on the Pacific coast. If you know any process which has been tried out in England and which has been a success, I should very much like to have full details.

Do not send me the Oxylene or Powell process as I know all about them. I would like to have an option for, say, at least three months for anything you can send me and would like you to treat on a royalty basis ; and I would ask you, if you will, to save time, to ask the owner of a process to communicate direct with me. If we were satisfied with same we would find the necessary capital for the erection of plants, etc., here. We would be glad if when writing they would send us the very fullest information possible, giving us all details regarding costs, etc., by what concerns being used, copies of testimonials, exact method of treatment, in what countries patented, in what countries the process is being used, and by whom. We would like all this in triplicate, if possible.

We would also be glad to get into touch with any firm that has any patented article that can be used by railways, as we are in personal and intimate touch with the leading railway companies in this country, and would like to acquire the rights on a royalty basis for anything that could be used by them.

We would either form a separate company over here and manufacture in this country, or import from the manufacturers in England—whichever they desire and was more practicable. If you know of any firm having such inventions, please ask them to communicate direct with us, giving us the very fullest information, illustrated catalogues, etc., copies of testimonials, by whom used, in which countries, etc., and preferably to send us everything in triplicate, and where possible to send us a sample by post. Besides the railways, we are in very close touch with most of the large engineering works here, and also in the United States. Thanking you in anticipation.—Yours, etc.

S. W. J. HYMANS.

Balfour, White and Co.,
136, St. James Street, Montreal.
May 6.

[Our correspondent's best course would be to consult the Classified Abridgments of Specifications which can be seen in any Patent Office in Canada or the United States.—ED. *C.A.*]

The British Empire Exhibition

Notes of General and Chemical Interest

It cannot be emphasised too often that Wembley cannot be seen in one day. It is possible to get a good idea of it in an hour, either on foot or from one of the little electric vehicles known as "Railodoks," but to see even the Chemical Section alone exhaustively requires more than one visit, so that it is impossible to estimate how long would be needed to do justice to the whole. There are not only the exhibits in the various buildings to be studied, but the grounds themselves provide many hours of quiet enjoyment, especially for those who are wise enough to invest 2d. in a chair ticket, which entitles the holder to sit in any of the hundreds of chairs about the grounds and buildings. Much of the charm of the lay-out is undoubtedly due to the exhibition having been built in what was an extremely beautiful natural park, and to the preservation of the hill-slopes and trees.

Amusements at Wembley

Last year, at the meeting of the Society of Chemical Industry in Cambridge, the suggestion was made that chemists would enjoy the roundabouts and coco-nut shies associated with the country fair. Such chemists (if any) should visit the Amusements Park. The remarks as to the beauty of grounds do not apply here, however, since it is a veritable backyard of the exhibition, though full of devices for amusement of the type indicated. There is, however, much that looks cheap, but is not.

Reference to prices suggests a words of warning to the visitor as to restaurants. These have various tariffs, which are displayed outside, and it is as well to glance at the prices first, otherwise afternoon tea at 7s. 6d. might come as an unpleasant surprise.

Interesting the Public in Chemicals

Most visitors to Wembley get there by the Metropolitan Railway from Baker Street station, and once inside the entrance it is necessary to turn either to the right or the left. Turning to the right, a colonnade leads past the Lucullus Restaurant to the Chemical Section. Undoubtedly the section, as a whole, thanks to its artistic coherence, interests the public, but it is a problem not always too easy of solution how to interest the general visitor in individual exhibits. Manufacturers of soap and scent have the work half done for them; it is only necessary to have a charming lady to sell the wares. But acids, oils, and bottles of dyes are not so attractive. Probably the best plan is that which has been adopted by a number of exhibitors, such as various dye firms and the United Alkali Co., of showing familiar important products for which the firm's chemicals are essential in manufacture.

Anyone who visited the Chemical Section a month ago will find many improvements. The gaps have been filled up and there is an absence of that unfinished appearance which was so liable to obtrude itself at the time of opening. The British Dyestuffs Corporation's stand is now virtually complete, and a number of others which were delayed for various reasons are now complete and are dealt with in the notes below.

The British Dyestuffs Corporation

Realising that the appeal of their exhibit must be made to the general public, the Corporation have not made any attempt to display a range of their products, but are showing a number of samples of dyed goods. The stand is surrounded by what are best described as glass-topped counters. Beneath the glass are a number of specimens of dyed and printed fabrics from different nations—India, Persia, China, Japan and so on. On the counter itself are a few samples of dry dyes, which cause comment because the dye is so often itself of a different colour from the effect it produces on the fabric. The floor covering in the exhibit is of rubber, which has been vulcanised with the aid of two of the firm's accelerators and dyed with "Vulcafore" rubber dyes. On the floor stand four tall erections from which hang a number of strips of fabrics dyed in various graduated shades. Behind these strips there are electric lamps which are controlled by an automatic rotating switch in such a way that the effect of falling splashes of colour is produced. Inside the exhibit there is a case which, however, is to be removed shortly and replaced by an exhibit of bottled specimens showing the various stages in the production of a single dye from the raw coal. The exhibits at present in the case are, however, a series showing fabrics dyed with the old natural dyes of 60 years ago, with the early artificial dyes and other items of historical interest, such as an authentic sample of Perkin's mauve. There are also specimen dyeings with mauve, and the old colour card of a British dye firm, including Professor Green's primuline.

Carnegie Brothers

This is a most effective stand in the form of a glass case and is mainly devoted to a display of strychnine and its salts, much use being made of the white and pale purple tinted forms in bottles, which form an artistic harmony with the jazz decoration of the structure. There are also to be seen samples of these compounds in the wrappings in which they are supplied to customers, and chemists will also find specimens of benzoates and citrates manufactured by the firm.

Herbert Green and Co.

As manufacturers of alcohol, Herbert Green and Co. are showing samples of the raw material, molasses, and the various forms of final product, including methylated, mineralised, rectified and other forms of industrial alcohol, fusel oil and the alcohols prepared from it, and the various denaturants now added to alcohol for industrial purposes, including mineral naphtha, pyridine, and the methyl violet dye which produces the now characteristic purple colour of common methylated spirit.

J. F. Macfarlan & Co.

Although mainly specialising on alkaloids, J. F. Macfarlan and Co. are showing samples of scammony and jalap resin and powder. The alkaloids displayed include "Opoidine," a prepared form of opium, strychnine and its common salts, some of them in the purple tinted form, morphine esters, salicin, and cotarnine hydrochloride, the last named substance being first prepared by this firm and afterwards copied by the Germans under another name. The whole exhibit is an excellent example of British alkaloid industry.

William Ransom and Son, Ltd.

This firm of manufacturing pharmaceutical chemists show in their stand which consists of a glass case, samples of medicinal plants grown on their estates near Hitchin, and of essential oils prepared from them. The firm has been making these products for nearly 80 years, and is representative of this successful, but little known British industry.

J. L. Rose.

This Barking concern shares a small stand with its associate, the Chemical Supply Co. The exhibit of J. L. Rose shows gall nuts and the products derived from them, gallic acid and some of its compounds. The Chemical Supply Co. display an extremely wide range of analytical and research chemicals, both organic and inorganic, which are very tastefully arranged.

The Salt Union, Ltd.

Naturally the principal exhibits of the Salt Union, Ltd., are various grades of salt prepared for the table or food preservation. There are also samples of rock salt and there is a model scenic piece with a salt "waterfall" showing the dryness and non-caking properties of the firm's table salt. Chemists will be interested in the samples of derived products which are shown, these being caustic soda, as solid and liquid, soda carbonate and bleaching powder.

Thomas Tyrer and Co.

The erection of this stand has been very much delayed, but it is now nearing completion and presents a striking appearance, being of an effective turreted design. A number of samples of fine chemicals are being shown, and particular use is made of highly coloured salts such as copper sulphate, potassium chromate, nickel sulphate and so on, in a kind of table-top design which runs round the outside of the stand, the name of the firm, and geometrical figures being filled in with these coloured compounds. When it is entirely finished, which should be the case by the time this note appears in print, this stand will be one of the outstanding ones in the section.

Canadian Chemical Products

There is more than one exhibit in the Canadian Building at Wembley which is of direct chemical interest. These are to be found in the corner of the building exactly opposite the one which would first be reached by a visitor coming from the Palace of Industry. The Dominion Tar and Chemical Co. have a most unusual type of exhibit for a chemical firm, consisting of a model timber train, running through Canadian forest scenery, illustrating the immense resources of raw materials behind the firm's wood products. Next to them is a combined exhibit of the Canada Carbide Co., Ltd., and the Canadian Electroproducts Co., Ltd., of Montreal. This consists of a glass case containing bottled samples of the products of the two firms—calcium carbide, acetic acid, acetic anhydride, acetaldehyde, " Shawinigan " carbon black, etc. There are also examples of the uses of these substances and other chemical products in the dyeing of silk, ebonite, and so on. The whole exhibit is an interesting display of the Canadian chemical industry, and proves, if proof were needed, that the Dominion can produce a wide range of chemical products of the highest class.

Oil Extraction in Nigeria

Inside the imitation brown sandstone walls of the Nigerian building there is an interesting combined exhibit of a modern plant for expressing oil from oil palm and bagging nuts and kernels. This has been arranged by Nigerian Products, Ltd., in conjunction with Manlove, Alliott & Co., Ltd., the well-known chemical engineers of Nottingham, the General Electric Co., Ltd., and a Westminster firm of consulting engineers. As is usual where machinery is in motion, considerable public interest is shown, and a convenient gallery has been built so that the operations may be watched from above. This plant together with the numerous samples of nuts and kernels, illustrates forcibly the commercial wealth of Nigeria.

Burmese Essential Oils

One of the pleasantest buildings in the exhibition is the Burmah pavilion. This is in the style of a Burmese temple, or similar building, with bells on the outside ringing in the wind. Inside there is an immense variety of exhibits of the kind associated with Eastern civilisations, which to the lay eye have a close resemblance to Japanese products. Among these the chemist may notice some familiar looking bottles of the kind usually to be found containing chemicals in exhibitions. In this instance the bottles will be found to contain various samples of the essential oils which are produced in Burmah.

Scientific Control in Power Plant

Power users interested in scientific control should pay a visit to the stand of James Gordon and Co., in the Palace of Engineering (Stand 148, Avenue 3, bays 13-14). The most interesting exhibit to the chemist is probably the Duplex Mono gas analysis apparatus. This is in effect an automatic Orstat, operated by water pressure alone. It is adaptable to measure the carbon dioxide, hydrogen and combustible contents of flue gases, producers gas, etc. To take the flue gas type as an example, a given volume is drawn in by the action of the mercury pump, and then passed through caustic and the volume of residual gas measured automatically and recorded on a rotating drum. Each alternate sample is passed through an electrically-heated tube of copper oxide to remove combustible gases, and the difference in residual gas volumes shows the percentage of combustible gases present in the flue gas, and is recorded direct on the chart. These analyses proceed automatically and continuously, and the apparatus may be seen working at the Power Station at the Exhibition.

Another product of the same firm which is in operation at the Power Station is the Rheograph V-notch waterflow recorder. This is used normally to measure feed-water, but is actually being used to record the water condensed in one of the three steam turbines. The particular turbine to which it is attached has been supplied by the English Electric Co., while the other two turbines, by the General Electric and B.T.H. companies, have Venturi and Lea recorders respectively for the condenser water.

Another aid to steam raising efficiency to be seen on the stand of James Gordon & Co. is the Cope's Feed-Water Regulator. This consists essentially of a copper tube, one end of which is connected with the steam supply and the other with the water from the boiler. As conditions vary the expansion and contraction of this tube are used to regulate the feed-water valve. It is claimed that though so extremely simple in operation, it is the most efficient type of feed-water regulator, because in the event of a demand for an extra supply of steam the water level in the boiler is allowed to fall to a lower limit before fresh water is introduced, thus automatically regulating the supply in accordance with the output of steam actually required. On the other hand, when little steam is being used the regulator allows more feed-water to enter until the upper limit is reached.

The advantages of superheated steam are so well known that the extremely simple form of sectional superheater shown on the Gordon stand will appeal to all steam users. This consists essentially of a number of single U-tubes which are expanded by a simple arrangement in the two headers. A great feature is that provision can be made for future extension when the plant is installed and it is interesting to note that some large chemical manufacturers have adopted this superheater, not only in the power house, but for the process steam, and in one case it is claimed that it has been possible to increase the output by 30 per cent.

Electrical Apparatus

In the Electrical Section of the Palace of Engineering the Foster Instrument Co. are showing various types of thermometers which are used in connection with temperature control in power plants. These are of two main types, the thermocouple type and the resistance type, and highly developed examples of each may be seen. The thermocouple type may be supplied either with rare or base metal couples, and an interesting feature of the exhibit is a set of instruments on the spot recording the temperature of the superheated steam in the power station at the exhibition. Optical pyrometers may also be seen which require no focussing and a minimum of adjustments in use, while there are various examples of industrial mercury thermometers, electrical instruments, and so on. A particularly interesting exhibit is an automatic furnace control installation consisting of a pyrometer providing continuous automatic record of furnace temperature coupled with lamp signalling and automatic control of furnace, applicable to a gas furnace, electric furnace and other heating processes.

Wood Distillation Products

There is an interesting display of the chemical products of wood distillation on the stand of Wilson Bros. Bobbin Co,, Ltd., of Garston (Avenues 3 and 4, Bay 4). Thus we find bottled samples of wood oil, wood tar and pitch, wood spirit, sodium acetate, acetic acid and acetone, and samples of various kinds of charcoal, including some specially prepared for refrigerators and also as a patent fuel.

Containers for Chemicals

Chemical manufacturers necessarily require containers for their products, and where glass is not essential they will find much to interest them on the stand of P. D. Mitchell, Ltd., in the Palace of Engineering (Stand 176, Avenue 1–2, Bay 9–10). This firm, whose works are at Dundee, claims to turn out more steel containers than any other. There is an immense variety of styles and patterns (drums, tanks, cans, barrels, etc.), and there is also a wide range of finishes available (galvanising, acid resisting paint, tinning, etc.). A speciality is a patent seamed welded steel drum of great strength, very suitable for chemicals, and, of course, being homogeneous, immensely superior to anything brazed or soldered. The firm can supply containers capable of standing up to a wide range of chemicals, including such difficult substances as mixed nitric and sulphuric acids, hydrofluoric acid, phosphorous oxychloride, etc.

A Patent Preparation

Among the stands in the Chemical Section devoted to soap and perfume preparations some are of direct interest to chemists. Harker, Stagg and Morgan are showing a patent preparation in the form of an antiseptic cream called " Peldo," which may be applied to the hands with the result that any form of oily dirt, tar, creosote, etc., or even dry powders such as oxides or white lead with which they are brought in contact is easily washed off with soap and water. Although in no sense resistant to acids and aqueous solutions it is claimed to be so effective an antiseptic that there is no danger when handling poisonous compounds, even if there are cuts in the skin. It is obvious that such a preparation should be of good use to some chemists.

The Making of Wealth (IV)

At Whose Expense is it Gained?—Why Some People must be Richer than Others—A Lesson from America

By Sir Ernest Benn

CAN wealth be made at the expense of others? It is obvious and evident that in some simple circumstances it can. One man can put his fingers into the pocket of another and extract a watch, and he becomes wealthier at the expense of the loser of the watch. Two persons can make a bet on a horse race; one can lose a sovereign to the other who quite definitely becomes the richer at his expense. And so within the elaborate, wonderful, and complicated machinery of wealth, production and exchange, there is room for the operation of the thief and for the trouble which arises from the existence of the fool. But an economic philosophy founded upon details of this kind leads straight to error. These details are the exceptions which prove the rule and are not in any sense examples of the ordinary processes whereby wealth is made and man is benefited.

If one takes a typical case of a man who has made great wealth one sees very clearly how the process operates. Lord Northcliffe started life as an office boy and left five millions at his death. Where did that sum of five millions come from? At whose expense was it made? Certainly not at the expense of the consumer, because at the height of Lord Northcliffe's activities, just before the war, he achieved what was previously thought to be impossible, and gave the public a 32-page paper for a halfpenny. Neither was his wealth made at the expense of the worker, for we know that during the period of his operations, and very largely as a result of them, printers' wages were doubled and every class of newspaper worker was raised to a higher scale of remuneration. Northcliffe not only paid much more to his own workers than had ever been paid to similar people before, but his action had the effect of lifting the rates of all similar workers in all similar businesses and added enormously in the aggregate to the wages of newspaper producers. Nor can it be said that Lord Northcliffe made his money at the expense of his competitors, for while it may be true that a publisher here and there had to go under in consequence of the higher standard set by Northcliffe's enterprise, it is certainly the fact that he so widened and increased the market for periodical literature as to enhance the value of all newspapers and multiply greatly their numbers and sizes.

The Real Effects of Competition

This brings me to the false impression that competition in business is a process whereby one man steals the orders of another. When two commercial travellers are both hoping to secure one order, one of them is doomed to disappointment, and it does seem at short range as if the one has benefited at the expense of the other. Such is actually the case when we have a small market and an article of limited consumption, but those conditions are very rare. The real effects of competition are to increase the market, increase demand, increase supply and benefit competitors as well as consumers. A simple illustration of this was given to us when Selfridge established himself at the western end of Oxford Street. No big store had appeared in that particular locality before, and the trade was carried on by a large number of small shopkeepers. These people, holding the short-sighted and erroneous view of competition, got into a panic as soon as Selfridge started to build. Some of them shut up shop. Rents around Selfridge's building declined for a time, and the theory was that this great monopolist was going to crush all the many little folk who had hitherto served their fellows by keeping shops. A very short period, however, sufficed to show the folly of this theory, and I believe the rents in the Selfridge neighbourhood were actually doubled within a few years of his starting. Here, then, is a case of a man going into a market to do himself a business in excess of the total of the whole market before he arrived, and yet leaving more than ever there was before for the remainder to share between them. Selfridge's fortune, so far from being made at the expense of others, has actually enriched all those around him.

Wealth Unlimited

The notion that wealth is made at the expense of others has its roots in the fundamental error that wealth is a fixed quantity—that there is a limited amount of it. So far from wealth being acquired at the expense of others, the truth is surely that—always granted those exceptions which are in the class to which I referred at the beginning—wealth can only be made on the condition that the bulk of it is distributed to others as the process goes along; and it only exists on condition that it confers benefit on others as well as on its owner.

The man who owns a million is commonly regarded as possessing that which ought to be given to those who are in greater need, but in point of fact, even if he leads a life of luxury and makes no pretence of saving the public, he cannot avoid adding greatly to the wealth of the community in which he lives. To begin with, his million is no good to him unless he employs it. He must invest it, and it does not matter how he invests it; the effect of his employing it must be to reduce the rate of interest on all other money for the benefit of all other people. In investing it, in order to earn interest at all, he must employ people, and the presence of that million, providing wages and calling for service, must have a tendency to increase all wages and add to the value of all services.

The word "service" is one of the most badly used words in the language; it is used in a way which reflects very little credit upon our economic intelligence. It has come to have a meaning which disassociates it entirely from any notion of profit. "Service" has been coloured by the Socialist, who apparently would have us each render the service that we ourselves decide, without the essential check which the consumer exercises through the normal process of the market under capitalism. The unequal distribution of wealth is absolutely essential in order that the consumer may have the means of expressing the different values which he places upon different services. This does not mean that some must be rich and some must be poor, but it does mean that some must be richer than others, the excess of riches being a measure of the consumers' valuation of the services which we all render to him.

The idea that wealth is made at the expense of others is essentially a political notion, and its wide acceptance may be attributed to the way we have of giving to politics an exaggerated importance. The politician's life depends upon his appeal to the vanity of the majority, and seeing that the majority must always be composed of those whose means will be modest beside those of the leaders, the politician is led into an attitude of antagonism to a small minority who, in any scheme of things, must rise to the top.

A Plea for Individualism

There is only one place that I know of which is almost free from this class of folly, and that is America, the reason being that the American nation is composed of people who, tired of the sophisticated complications that are characteristic of European life, have at various times run away to the freer atmosphere of a new world. The American is almost a hundred per cent. individualist. He starts with the first rule of sound economics summarised in the old dictum, "Look after the pence and the pounds will look after themselves." He realises that if each individual will do the best for himself, which must always be the best for others, then the best for the whole will emerge. In America there is an independent people; here, in our own country, you have a dependent people, the individual for the most part hugging the false idea that in some way or another he has a claim on the rest.

If everybody will try to give a little more than he gets he will find that what is left for him will be more than ever he had before. In this complicated way—this paradoxical way, if you like—wealth untold still remains to be acquired for the benefit of all of us. We cannot make wealth at the expense of others, but we can each of us make a good deal of wealth for ourselves if we will recognise that in so doing we cannot avoid distributing the bulk of it to those by whom we are surrounded.

Handling of Compressed Gases

Rules for Avoidance of Accidents

THE American Gas Products Association has recently drawn up a series of rules for the safe handling of cylinders containing compressed gases. Though these are simply applied common sense plus chemical knowledge, it is decidedly useful to have facts of this kind incorporated in easy rules for the use of workers concerned in any way with the handling of compressed gases in cylinders. The following are the rules as recommended :—

Oxygen

1. Compressed oxygen plus oil is explosive. Allow no oil or grease of any kind to come in contact with valve, regulator or any other portion of the cylinder or apparatus.

2. When shipping empty oxygen cylinders to manufacturer, lower portion of green tag attached to cylinders should be removed at the perforated line. Any green sticker label found pasted to the cylinder should be removed. Bill of lading should specify that the cylinders are empty and serial numbers of the cylinders should be noted thereon.

3. Cylinders of oxygen, except those in actual use and in excess of approximately one day's supply required in any one department or point about the shop, should be stored in a place where they will not be tampered with by unauthorised persons.

4. Oxygen cylinders should be stored in a safe, dry place, where they will not be exposed to the heat of stoves, radiators, furnaces, or in the direct rays of the sun. Heat will increase the pressure and it may cause the safety plug or disc to melt or blow, thus allowing oxygen to escape, resulting in waste. If the escaping oxygen comes in contact with even the smallest flame it has such a tremendous influence upon combustion that a quick raging fire is likely to result.

5. Cylinders of oxygen are never to be stored in the same room used for the storage of calcium carbide, cylinders of dissolved acetylene or other fuel gases, or with acetylene generators.

6. Open flames of any description shall not be employed in any building used for the storage of oxygen cylinders.

7. If cylinders are stored on the ground or open platforms, such locations should not be adjacent to points where there is a large amount of combustible material.

NOTE :—While oxygen itself will not burn, its effect in aiding combustion, once a blaze is started, makes it important that rules 4 to 7 inclusive be carefully observed.

Acetylene, Hydrogen, Etc.

1. When cylinders of dissolved acetylene, hydrogen, liquid fuel gases or vapours are not in use, outlet valves shall be kept tightly closed, even though cylinders may be considered empty, and valve caps replaced.

2. Cylinders should be stored in a safe, dry, well-ventilated place, where they will not be unduly exposed to the heat of stoves, radiators, furnaces, or the direct rays of the sun. Heat will increase the pressure, or it may melt the fusible safety plug with which most cylinders are provided and which melts at a temperature of approximately 212° to 220° F.

3. No open flame, grinding tools or spark-emitting devices shall ever be used within the storage building or compartment, and all artificial lights shall be incandescent electric and shall be installed in accordance with the " U.S. Electric Code for Rooms in which Inflammable Vapours may Exist."

Electric light switches, telephone and all other apparatus which may cause a spark must be located on the outside of the building.

All lamps shall be enclosed in vapour-proof globes of the Marine type.

4. Cylinders of dissolved acetylene shall always be stored standing upright with valve end up.

5. When shipping empty dissolved acetylene cylinders and other fuel gas cylinders to manufacturers, the lower portion of the red shipping tag attached to cylinders should be removed at the perforated line. Any red sticker label found pasted to a cylinder wall should also be removed. Bill of lading should specify that the cylinders are empty, enumerating the type and individual numbers of such cylinders.

Under no circumstances attempt to transfer acetylene from one cylinder to another and never under any conditions attempt to compress acetylene into a cylinder. This work should only be performed by acetylene charging plants, and under conditions which comply with Interstate Commerce Commission regulations.

General Rules

1. Oxygen cylinders and acetylene, hydrogen or other fuel gas cylinders shall not be transported or lifted by crane or derrick except when they are in a cradle or substantial stand, and cylinders shall never be handled with electromagnets or with rope or chain slings.

2. Cylinders should be handled carefully, should never be dropped, and should be placed so they will not fall nor be struck by other objects. Knocks, falls or rough handling are likely to damage the cylinder, valve or fuse plugs, and cause leakage, and may even result in an explosion.

3. When exhausted, cylinders shall be returned as rapidly as practicable to the storage building or place, and from there to the manufacturer. Empty cylinders should be marked " Empty " and stored apart from full cylinders to prevent confusion. Valve protection caps must be replaced.

Silicate of Soda and Concrete

(FROM A CORRESPONDENT.)

ONE of the most interesting papers read at the recent International Cement Conference in London was that on the subject of silicate of soda and concrete by Mr. L. A. Munro, B.A. As is well known, the simple and inexpensive silicate of soda process for hardening concrete after setting, and at the same time decreasing the permeability to water and oil, is one of the most important of recent developments in the science of concrete.

The chemical changes that take place during the setting of cement are extremely intricate, but there is no doubt that free hydrated lime is formed by the action of water upon polycalcium silicates. This lime then reacts with the dilute solution of silicate of soda after it has penetrated the pores of the concrete, and precipitates calcium silicates, thus filling up these pores. The formation of the dense and hard outer layer is probably, however, assisted by the separation of colloidal silica (SiO_2) from the sodium silicate solution.

There is given in the paper an account, together with a detailed drawing, of the interesting motor-driven abrasion machine designed by Messrs. Brunner, Mond and Co.'s research staff and constructed in their own mechanical workshops. This machine is in operation at the firm's stand in the Chemical Section in the Palace of Industry at Wembley, and consists essentially of two hardened pieces of steel that are moved backwards and forwards over the surface of the block of cement to be tested. At the same time standard sand is fed down the centre of the two steel blocks in such a way that it is distributed evenly between the steel and the sand-cement block, being subsequently blown away by compressed air. In this way the very pronounced hardening effect of silicate of soda is demonstrated in a striking manner as the blocks are treated on one half only with the P.84 brand. On exposure to the machine the untreated half is rapidly worn away after a few minutes, whilst the other portion is almost unaffected.

Mr. Munro also points out that the silicate of soda process will undoubtedly prove to be of considerable value in protecting concrete surfaces from the sea, since, as shown by R. J. Wig and L. R. Ferguson, the chief objective is to prevent the surface of the concrete from being broken by the stones and other material dashed against it. At the same time, also, concrete used for this purpose should be as dense as possible to resist penetration by the water over all the area exposed, as apart from the broken portions. Silicate of soda is obviously, therefore, of great value in this connection since it both hardens the concrete and renders it much more impermeable to water. Further, the silicate of soda process increases the impermeability of concrete to oil and in this way concrete tanks that are almost completely impervious to oil can be constructed without difficulty. It is understood that research work is being undertaken, which is already showing promising results in the directions of waterproofing concrete by this means.

Finally, Mr. Munro mentioned other interesting possibilities of the use of silicate of soda such as, for example, the addition of a small amount to the gauging water which improves the resistance to abrasion although at the same time increasing the rapidity of setting, the manufacture of acid-proof cements, and the internal lining of chimneys.

Brunner, Mond and Co.'s Annual Meeting

Progress During the Past Year

MR. ROSCOE BRUNNER, chairman of Brunner, Mond and Co., Ltd., at the annual general meeting of the company in Liverpool, on Friday, May 23, in announcing a dividend of 10½ per cent. for the year on the ordinary shares, said that it was just as disappointing to the directors to have to propose a lower dividend as it was to all of them as shareholders to receive it; but after balancing good indications against bad it seemed to him that they might look forward with confidence to the future.

Synthetic Nitrogen

He then referred to Synthetic Ammonia and Nitrates, Ltd., who, he stated, had started their plant at Billingham in December last. "I have told you before," he added, "that the process was new to us, that much of the engineering was new to British science, and we expected there would be difficulties. There were very considerable difficulties, but they have been surmounted, and the process is working to our complete satisfaction—(cheers)—so much so that our staff there is busily engaged in designing plant for an extension of the output and for the production of ammonia salts other than sulphate. The sulphate of ammonia produced at these works is the purest on the market, and it has met with great favour all over the world.

The Magadi Soda Co.

"You will all of you, no doubt, have noticed references in the newspapers to the Magadi Soda Co., which is now, after a uniformly unsuccessful career, in compulsory liquidation. We have made certain proposals to the Official Receiver and the Colonial Office for the reconstruction of that company. Those proposals are still under consideration and no decision has yet been reached. I hear this morning there is a rumour on the Stock Exchange that the persistent buying of Magadi shares is due to purchases by Brunner, Mond interests. I have to tell you that no purchases have been made by Brunner, Mond and Co. nor in their interest, nor, so far as I know, has any individual connected with Brunner, Mond and Co. purchased a single share.

Not a Sheltered Trade

"The Chemical Employers' Federation, in common with most employers (said Mr. Roscoe Brunner), has been asked for increases of wages. We twice postponed discussion because the conditions of our industry did not warrant the increases, but lately we consented to go before the Industrial Court. The hearing took place last week, but the award has not yet been delivered. We asked the Court to say not only that the increases we have given, as compared with the cost of living, leave our men better off than they were in pre-war days, that the state of our industry does not justify increases of wages, and we strongly urged upon the Court that our rate of wages should not be compared with the wages of the sheltered trades, but with those of trades which, like ourselves, are dependent for their success upon their ability to compete in the world markets."

Sir Alfred Mond's Comments

Sir Alfred Mond, who was warmly greeted on his first appearance after his reappointment as a director of the company, seconded the resolution, and said, though they might be disappointed at the slight reduction in dividend, they would see from the figures that the directors were conserving out of the profits a considerable amount in order that their great business might be maintained on sound lines. It was easy to obtain a cheap popularity and a fictitious share value by distributing all their profits, especially if there were no intention of continuing a business for generations; but he reminded the shareholders that the policy of Brunner, Mond and Co. for over 50 years had been to stand at the head of the chemical industry by continuous improvements in their plant, by development and scientific invention, and, if necessary, by modifications and re-modifications. On the subject of higher wages, Sir Alfred remarked that they could not be paid out of the relatively small amount of surplus wealth in the country, but only out of greater productivity, and a more economical production by the great industries of the country, and it was the duty of all who were interested in industry to labour to that end.

Remarkable Scientific Achievement

The speaker referred in glowing terms to the remarkable scientific achievement of the staff in connection with the Synthetic Ammonia Works, and declared that it was a remarkable tribute that the technical difficulties and complexities of the process had been overcome in so short a time. He reminded the shareholders that this was not merely a commercial matter, but it was of great national importance, inasmuch as it would, if the occasion arose—and they hoped it would never arise—by the means of supplying high explosives for the security of the country. Sir Alfred pointed to the fact that it took Germany 15 to 20 years to develop the method of making synthetic ammonia, and that without it Germany could not have carried on the war for six months.

Trade Prospects in the East

Referring to his recent visit to India, Sir Alfred said both there and in the East generally trade would expand as the world secured peace, and if, as they hoped, there was to be a settlement of the European question, on the report of the Dawes Commission, trade would settle down, and there would be a large expansion of business. This, in his opinion, was what was required to bring back normal conditions, and would, he felt sure, be one of the greatest factors in restoring the trade of the world.

The resolution was unanimously carried.

On the proposition of the Chairman, seconded by Mr. Emile Mond, the six retiring members of the board of directors—namely, Sir John Brunner, Mr. A. Colegate, Mr. H. Glendinning, Mr. J. H. Gold, Mr. C. F. Poole and Mr. L. Solvay—were re-elected.

Sir John Brunner proposed a cordial vote of thanks to the officials, staff, and workmen of the company and of the subsidiary companies at home and abroad, declaring that the entire staff was at the highest pitch of efficiency he had ever known. Sir John also alluded to the success of the scientific work in connection with Synthetic Ammonia and Nitrates, Ltd. The vote was passed unanimously, as well as one to the chairman and directors.

The Dye User's Position

Mr. A. Hoegger on the Proposed German Agreement and the Cost of Dyestuffs

MR. A. HOEGGER, chairman of the British Cotton and Wool Dyers' Association, at the annual general meeting on Wednesday last week referred at some length to the problems of obtaining dyestuffs from the user's point of view. He said that the most outstanding feature connected with the colour industry was the proposed agreement between the British Dyestuffs Corporation and the Interessen Gemeinschaft, frequently referred to as the "Anglo-German Dyes Combine." The first announcement of anything tangible was made in the *Manchester Guardian* of January 25 last. From this article it was understood that the British Dyestuffs Corporation should have the monopoly of the British market and a percentage share of foreign and colonial markets. It should also be able to draw on the Interessen Gemeinschaft for *personnel* and information as to manufacturing and technical processes. The Interessen Gemeinschaft, in return, would receive a half share in the profit of the British Dyestuffs Corporation.

"It would appear," the chairman continued, "that these negotiations have the approval of the Board of Trade, as in their view a satisfactory agreement would increase the efficiency of the dye-making industry of this country. It is difficult to see how such an arrangement could benefit any dye makers other than the British Dyestuffs Corporation. (Hear, hear.) Sir William Alexander, in his address to the shareholders of the British Dyestuffs Corporation on April 8, gave some further information regarding the proposed agreement, but said it was impossible to enter into details until the Government had expressed approval of the scheme. He stated that it was originally intended that the Interessen Gemeinschaft should not sell dyes direct to British consumers, but only through the British Dyestuffs Corporation. In order to meet the views of users, however, this proposed arrangement had been modified so as to enable consumers to get dyestuffs from Germany in any way, subject only to legislative restrictions.

"There has been a general fear that any arrangement with Germany would result sooner or later in a restricted output of

dyes in this country, but Sir William Alexander anticipates the contrary. He believes that if the negotiations are brought to a satisfactory conclusion they will result in an increased output and an expansion of the range of dyestuffs manufactured. He also considers that the arrangement would not only secure a national industry for peace-time requirements, but that it would 'provide the nation with an equipped and trained *personnel* as a most valuable contribution to our defences in time of peril.' In view of this opinion it is difficult to understand the attitude of the Interessen Gemeinschaft in being so willing to assist in the establishment of a British dyestuffs industry."

The Cost Factor

Mr. Hoegger then pointed out that Sir William Alexander had recently stated that during the past three years, on account of manufacturing improvements and economies, the British Dyestuffs Corporation had been enabled to reduce the average selling price of their dyestuffs from 4s. to 2s. 6d. per lb. "Our Association," he continued, "uses a great variety of dyestuffs, and we find the average price of British dyes at the present time to be considerably more than 2s. 6d. per lb. In December, 1921, the average price of all British-made dyes which we use was 6s. 6d. per lb., and in December, 1923, the average price was 4s. 4d. per lb. Since December last prices have fallen a little, and the average price now will be about 4s. per lb., or slightly more. The average price may be calculated in more than one way and with quite different results.

"Our figures are obtained by adding together the prices of all the colours used by us, and dividing by the number of items. If the calculation were based on total turnover or consumption it is evident that the result will vary considerably according to the relative amounts of low-priced and high-priced dyes sold. On this basis the average price of all imported dyestuffs (alizarine, aniline, and synthetic indigo) in 1913, according to the Board of Trade returns, worked out to 11d. per lb.

"During the year," he said, "there had been fewer complaints than formerly regarding the granting of licences for the importation of foreign dyestuffs, though satisfaction was by no means generally given, especially when application was made on price grounds. Moreover, in those cases where licences had been ultimately granted there had often been much unnecessary correspondence with the Licensing Committee, causing irritating delay. Inasmuch as applications for licences based on price grounds (involving the three times factor) were frequently though not invariably granted, the Colour Users' Association had repeatedly pressed the Board of Trade to requisition Reparation dyestuffs on the same grounds, but hitherto the Board had not acceded to the request."

Glue Manufacturer Discharged from Bankruptcy.

THE affairs of William Noble, formerly 7, Baldwin's Place, Gray's Inn Road, W.C., who was adjudged bankrupt in October, 1922, and who had formerly carried on business as a glue manufacturer under the style of the Col-Wa-Glu Co., came before Mr. Registrar Francke at the London Bankruptcy Court on Friday, May 23, on the hearing of his application for an order of discharge. In reading his report on the application the Official Receiver said that in his opinion the amount of the unsecured indebtedness was £6,241, while the assets, which were valued by the debtor at £92, had realised £5. Having bought for £500 the formula of a secret process for making a cold water glue, the debtor began the above business at the above address and with a factory at Brentford; but in consequence of the unsatisfactory condition of the glue when manufactured in large quantities, although numerous experiments had been made with the object of perfecting the process, no effective business was transacted until February, 1918. The debtor attributed his insolvency to heavy expenditure incurred in perfecting the process and to the cancellation of orders. He admitted that he knew that he was insolvent in October, 1919, when there was a deficiency of £453, but said that he continued in the hope that business would improve. Since that date liabilities amounting to £3,562 had been incurred.

The Official Receiver opposed the application on certain statutory grounds, and the discharge was granted subject to the debtor consenting to judgment in a sum of £50.

Ammonium Perchlorate Claim

Alleged Improvements to a Secret Process

ON Monday in the Law Courts the hearing of a claim was commenced before the Royal Commission on Awards to Inventors concerning an alleged invention for an improved process for the manufacture of ammonium percholorate used in the Government factory at Langwith during the war. The claimants were Mr. C. W. Bailey, chemist, of Salisbury House, London, E.C., Mr. H. S. Denny, described as a metallurgical and mining engineer of the same address, and Mr. A. J. Dunk, chemist, of Clapton. Other claimants were Mr. J. A. Cresswick, chemist, of Australia, Mr. R. Young, engineer, Mr. A. T. Jeffries, of Australia, and Mr. J. G. Williams, chemist.

It is understood that the process used before the war for the manufacture of ammonium percholorate was a secret one in the possession of the Swedish firm of Carlson, now Stockholm's Super Fosfat Fabriks Aktienbolog. Owing to war risks it was arranged that the Government should manufacture this product here under licence at a special factory which was erected at Langwith in Wales. For one cause or another the process did not prove entirely successful, and the claimants stated that they had introduced certain improvements and put it on a workable basis. Owing however to the fact that a secret process was involved the case was heard *in camera*.

On Monday the case was opened for the claimants, before the Commission, consisting of Mr. Justice Tomlin, Mr. R. F. Norton, K.C., and Mr. A. Chaston Chapman. Mr. J. Whitehead, K.C., and Mr. Terrel appeared for the Crown, and the Hon. Stafford Cripps for the claimants. Messrs. Bailey, Denny, Dunk, Young and Williams appeared in person, and the hearing was adjourned until Monday next.

Canada's Valuable Talc Resources

THE High Commissioner for Canada in London has received from the Dominion Department of Mines at Ottawa the following from Mr. Hugh S. Spence of the Mines Branch:—

Canada stands sixth on the list of the world's talc-producing countries, and in 1922 produced over 12,000 tons, most of which was ground talc. There are three producing regions, in Quebec, Ontario and British Columbia respectively, that in Ontario being the most important.

Talc of fair quality occurs in the eastern townships of Quebec, but has never been actively worked. The deposits consist of bands of altered schist that can be traced for considerable distances. These bands are made up of thin, fissile layers of talc, which, when ground, yield a grey or cream powder possessing high slip. The deposits are large enough to yield a considerable tonnage of grey talc, well suited to the requirements of the paper, rubber and paint trades, and fully the equal of the best talc mined in the adjacent State of Vermont, U.S.A. Talc from Vermont is imported into Canada in considerable quantities and could well be replaced by the domestic product. Latterly, small amounts of bloc talc from the Quebec field have been used as lining material for the smelting furnaces of sulphate pulp mills in the province; but the stone is considerably checked and flawed, and does not cut as strong a brick as the regular soapstone ordinarily used. Large deposits of the latter grade of stone have recently been discovered in Western Ontario, and it is expected that their exploitation will be taken in hand at an early date.

The Ontario talc industry centres around the town of Madoc, midway between Ottawa and Toronto, where three mines, each equipped with a mill, have been opened up on lenticular bodies of foliated, white talc enclosed in white, crystalline dolomite. The mills make a very high grade of white talc, which finds its principal market in the talcum powder, textile, paper, soap and rubber trades. A great deal of the talc from this district is exported to the United States, and a growing interest is being shown in it by the trade in Great Britain.

In British Columbia, a belt of talc-bearing rocks extend for many miles, in the lower Fraser River country and along the Pacific Great Eastern Railway, and a small amount of grey talc has been taken from this region, principally for use in roofing materials. Similar talc is found also on Vancouver Island, near Victoria, and is worked on a small scale. A deposit of fine, cream-coloured steatite, or massive talc, was discovered some years ago.

Chemical Matters in Parliament

Poison Gas

In a reply to Mr. Graham White (House of Commons, May 26) Mr. Clynes said that the question of the use of poison gas in warfare was the subject of Article V of the Treaty signed at Washington on February 6, 1922, by the United States of America, the British Empire, France, Italy and Japan. The Assembly of the League of Nations had requested a special committee to prepare a report on the effects of chemical discoveries in the case of war, but the committee had not yet, however, reported, and he was not at present in a position to say when the committee was likely to do so.

German Reparation (Recovery) Act

Mr. Graham, Financial Secretary to the Treasury (House of Commons, May 26) in reply to a question by Mr. F. Wise, said that the sums paid into the German Reparation (Recovery) Act accounts in the months of April, 1924, and April, 1923, were £147,000 and £698,000 respectively.

White Lead Convention

Mr. Henderson, Secretary for Home Affairs (House of Commons, May 27), replying to Mr. D. G. Somerville, said that the White Lead Convention had been ratified by three Powers, ratified though not formally registered by four others, and in seven others legislative proposals to give effect to the draft Convention had been laid before the respective legislatures. He added that in France the use of white lead in painting operations carried out by operative painters, whether on the exterior or interior, was prohibited by a Decree dated July 20, 1909.

Dyestuffs Agreement

Mr. Webb, President of the Board of Trade (House of Commons, May 27), in answering questions, said that he understood that the terms of the proposed agreement between the British Dyestuffs Corporation and the I.G. were still under consideration. He had not yet got the terms of the agreement, and was not in a position to make a statement on the subject.

Coming Smoke Abatement Bill

Mr. Wheatley (House of Commons, May 28), in a written reply to a question by Mr. Lorimer, states that the Government hope to introduce a Bull dealing with the subject of smoke abatement at an early date.

Bentonite

BENTONITE is an unusual type of clay possessing remarkable colloidal properties, states Mr. W. M. Myers, assistant mineral technologist, Department of the Interior, in Serial 2587 of the U.S.A. Bureau of Mines. Bentonite is a hydrous aluminium silicate combined with varying amounts of the alkalis sodium and potassium and the alkaline earths calcium and magnesium. No chemical formula can be given for bentonite as its chemical composition is too indefinite. Montmorillonite is a hydrous aluminium silicate combined with alkalis and alkali earths, and is very similar to bentonite, so much so that it is impossible to make a definite decision and state whether a mineral specimen under examination should be called bentonite or montmorillonite. One of the most characteristic properties of bentonite is its ability to absorb large quantities of water and to form colloidal jelly-like suspensions when mixed with water. Some forms of bentonite do not form these suspensions.

Serial 2289, issued some time ago by the Bureau of Mines, listed various uses of bentonite. In addition to these uses, it has been discovered that an excellent material for bleaching oils may be prepared from this material. California bentonite is used, and, to avoid the mechanical difficulties which arise in handling the jellylike colloidal suspension, a bentonite is chosen which does not form these suspensions. This bentonite or montmorillonite is heated with sulphuric acid which removes the alkalis, alkaline earths and some of the aluminium, leaving a residue composed of extremely fine grains of aluminium silicate. This material, when substituted for fuller's earth, displays remarkable efficiency in bleaching oils; in fact in some tests it has shown a capacity for this purpose 16 times that of corresponding amounts of fuller's earth.

Affairs of the London Chemical Works, Ltd.

A MEETING of the creditors of the London Chemical Works, Ltd., Scott's Road, Southall, Middlesex, in voluntary liquidation, was held on Monday in London. The chair was occupied by Mr. A. N. Stockdale, of 138, Glenwood Avenue, Westcliff-on-Sea, who had been appointed to act as the liquidator in the voluntary liquidation of the company. It was reported that the liabilities of the company totalled £25,493 11s. 10d. According to the books the assets totalled £37,697.

The Chairman reported that the company went into voluntary liquidation on May 5. During the first year or two of its existence the company appeared to have been fairly successful owing to the large demand for its chemical productions, and the good prices which were obtainable for its manufactures. Later it was decided to increase the capital to £75,000, and the works were extended. The business then began to decline, and after manufacturing on a small scale the place was closed down for a few months. In July, 1922, there was an issue of mortgage debentures amounting to £15,000, which carried interest at the rate of 8 per cent. per annum. The capital was increased by £10,000 to £85,000. Of that £10,000 new capital £5,150 was issued and was fully paid. From that date up to the time of the liquidation the trading of the company resulted in a loss of approximately £15,000. The reason given by the managing director for the loss was that the plant was in a very bad state when he took over control.

Some little time ago the company failed to pay the interest on the debentures, and in March an application was made for the appointment of a receiver. The directors were then negotiating for the introduction of further capital with a view to an amalgamation with other concerns. A creditor for £600 filed a petition for the compulsory liquidation of the company. The petition came before the Court the day after the company went into voluntary liquidation, and the hearing was adjourned. The assets of the company were all covered by the debentures, and of the remaining liabilities about £225 would be preferential. No value had been placed upon the goodwill and it was impossible to say what the assets were likely to realise. It was, however, hoped that they would produce sufficient to discharge the debentures in full and at least leave something for the creditors. A receiver was appointed by the Court, and was in possession of the whole of the assets.

After considerable discussion the resolution was carried on a show of hands, but defeated upon a poll being taken.

The petitioning creditors' representative stated that they proposed to proceed with their petition.

Comparative Composition of Various Tars

A STUDY of the comparative composition of various tars has been undertaken by Mr. J. D. Davis, chemist, United States Department of the Interior, attached to the Pittsburg experiment station of the Bureau of Mines. Coal tars from various sources will be distilled under uniform conditions by the Hempel method. The following tars will probably be tested: Low temperature tars by the processes of Parr, Wallace, Carbo-coal, Piron and Green-Lauks; coke oven tar; gasworks tar; water-gas tar; and lignite tar from the Bureau of Mines carbonising oven. Specific gravities will be determined and Barrett analyses made on the fractions. In this way a table of comparisons will be obtained giving information regarding motor fuel production and other matters of interest.

Trade in German Occupied Territory

MR. C. J. KAVANAGH, Commercial Secretary in Occupied Germany, resident in Cologne, is at present in this country for the purpose of a short official visit. Mr. Kavanagh will be in attendance at the Department of Overseas Trade from June 2 to 13 inclusive and will be pleased to interview British manufacturers and merchants interested in export trade to Occupied Territory of Germany. Applications for interviews should be made at once to the Comptroller-General, Department of Overseas Trade, 35, Old Queen Street, London, S.W.1, the reference T.G. 5358 being quoted in all cases.

From Week to Week

BUSINESS at the Birmingham Section of the British Industries Fair is stated to have been better than it has ever previously been there.

THE DEATH TOOK PLACE on Thursday, May 22, of Sir Milton Sheridan Sharp, chairman of the Bradford Dyers' Association, at the age of sixty-eight years.

THE *European Commercial* annnouces that an exhibition of Austrian products will be held at the Central Hall, Westminster, from May 29 to June 6.

MR. ALEXANDER WOOD, of Emmanuel College, Cambridge, has been reappointed University Lecturer in Experimental Physics for a period of five years.

AT A MEETING of the Birmingham Natural History and Philosophical Society, on Tuesday, Dr. J. R. Ratcliffe delivered a lecture on "Liquification of Gases."

SIR JOHN BRUNNER, M.P., has presented a £50 silver challenge trophy for the gardeners' and amateurs' open section at the Southport Flower Show in August.

IT IS REPORTED from Winnipeg that a plant for the manufacturer of paper pulp from straw is to be erected shortly at a place situated north of Selkirk. The property on which the plant will be located covers an area of 30 acres.

RESEARCH and education in Liverpool will benefit by the surplus of just over £780 which the local committee organising the meeting of the British Association there last September has realised from receipts for excursions, subscriptions, etc.

THE PRINCE OF WALES is to receive the Royal Society of Arts Albert Medal for 1924 in recognition of services rendered to arts, manufactures, and commerce, as President of the British Empire Exhibition, and by his visits to the Dominions and India.

AN IMPORTANT CHANGE of address is announced by the St. Helens Cable and Rubber Co., Ltd., to take effect from July 28. The works at Warrington will be closed from that date, and the business of the firm will be carried on at Slough, the address being St. Helens Works, Slough.

AN EMPLOYEE at the Mersey Copper Works was killed on Thursday, May 22, while working on the lithopone process. He went to stop a fan which was used for the cooling of the material and was later found lying unconscious behind the door of the fan shed with a wound on the side of his head.

AN ASSISTANT CHEMIST formerly employed by Bayer's dyeworks at Leverkusen, has been sentenced at Würzburg to six months' imprisonment for the betrayal of industrial secrets. He was convicted of having sold a number of dye secrets, of which he had illegally obtained possession, to persons in Great Britain and the United States.

AN IMPROVEMENT of some importance to science students has been made in the library arrangements at Leeds University. The science library has been fitted with steel bookshelves, and contains some 12,000 volumes. The room is believed to contain the best collection to be found in Yorkshire of material for research in most branches of science.

SIR RICHARD GREGORY in his presidential address on "Science in Civilisation" before the South Eastern Union of Scientific Societies at Guildford, on Wednesday, said that it was the duty of science to fight ignorance and all that was implied by it, to be intolerant of all that was false, to make honest doubt a virtue and condemn credulity as a crime.

THE "MAY MEETING" of the Institute of Metals will be held in London on June 4 at the Institution of Mechanical Engineers, when Dr. F. W. Aston, F.R.S., will deliver a lecture on "Atoms and Isotopes." Anyone wishing to attend should send a stamped and addressed envelope to Mr. G. Shaw Scott, M.Sc., the Secretary and Editor, the Institute of Metals, 36, Victoria Street, London, S.W.1.

A REPORT just issued by the Departmental Committee on the Fertilisers and Feeding Stuffs Act of 1906 (H.M. Stationery Office, price 1s.) contains a number of recommendations for the prevention of misrepresentation and fraud. Although the Commission point out that the fertiliser business is not more liable to unjust dealing than other trades, the recommendations should do much to discourage any attempts of the kind. It is hoped to publish a summary of these shortly.

AT THE ANNUAL MEETING of the National Academy of Sciences recently held in Washington, D.C., U.S.A., Dr. Frederick Belding Power was elected a member of the Academy. Dr Power now occupies the position of Director of the Phytochemical Laboratory in the Bureau of Chemistry of the United States Department of Agriculture, and it will be remembered that he was Director of the Wellcome Chemical Research Laboratories in London from 1896 to 1914.

MR. H. N. SPICER, of the executive staff of the Dorr Co., and Mrs. Spicer, will sail for London on June 4, as the first step of a tour of Europe that will take from four to six months, and that will cover practically every important industrial section of the Continent. Mr. Spicer will make a special business survey, both in a general way and in connection with the Dorr Co.'s European business. He will make his headquarters in London, at 16, South Street, E.C., but will spend most of his time in Spain, Italy, Austria, Czecho-Slovakia, Poland and Germany.

IT IS REPORTED that an American engineer has, after two years' experimenting at Sheepbridge, near Sheffield, invented a new process for the reduction of iron ore at a low temperature. The inventor claims to have proved that he can save £1 per ton on the production of iron, and Sheffield metallurgists who have made iron produced by the process say the steel shows attributes 50 per cent. better than good steel of the same character as made at present. The new system is said to obviate the necessity for importing high-grade foreign ore or burning expensive metallurgical coke.

A DEMONSTRATION of the possibilities of the use of the X-rays in industry is to be given before a number of leading manufacturers and members of the Federation of British Industries on or about Tuesday, June 17. Some time ago Dr. V. E. Pullin, of the Research Department, Woolwich, gave an address before the Federation and in the discussion it was suggested that a demonstration should be arranged and in response to a letter to the Research Department an invitation has been extended to members of the Federation to attend a demonstration of some of the results of recent radiological research at Woolwich.

AT A JOINT MEETING of the British Society of Master Glass Painters and the Society of Glass Technology, on Tuesday, Lord Crawford presiding, Professor W. E. S. Turner, of Sheffield University, speaking of the weathering of glass, claimed that the prime cause of decay was water. Glass absorbed water, which caused the glass to swell, and certain chemical changes followed. The factor of durability was influenced partly by the physical treatment of the glass, but mainly by its composition. Mr. Noel Heaton also gave a lecture, in which he stated that the composition of modern glass was almost identical with that of the Roman.

AN EXPLOSION OF NAPHTHALENE resulting in the death of one man and injuries to five others, occurred on Monday in a shed at the end of a tunnel at Manton, near Stamford. It appears that some naphthalene which the men were using in a flare lamp had been spilled on the ground and coming into contact with the flame from the lamp had caught fire. The flames spread rapidly and in a short time the shed which was used as a store for workers tools, lamps, etc., was ablaze. The men were running to the place with the idea of helping to put out the fire when a barrel of naphthalene exploded, setting fire to the men's clothing and burning them badly.

Chemical Papers at the Royal Society

AT a meeting of the Royal Society, which is to be held on Thursday next, June 5, at 4.30 p.m., the papers to be read are expected to include one by Dr. V. Henri and M. H. de Làszlò on "The Analysis of the Absorption Spectrum of Naphthalene Vapour; the Structure and Activation of the Molecule of Naphthalene," communicated by Sir Ernest Rutherford, F.R.S. In addition, there are to be papers by Mr. W. Jevons on "The Band Spectra of Silicon Oxide and Chloride, and Chlorides of Carbon, Boron, and Aluminium," communicated by Professor H. C. Plummer, F.R.S.; Mr. R. C. Johnson; "Ultra-violet Emission Bands Associated with Oxygen," communicated by Professor T. R. Merton, F.R.S.; Sir Richard Paget: "The Nature and Artificial Production of Consonant Sounds." communicated by Sir William Bragg, F.R.S.; and by Dr. H. S. Allen on "The Band Spectrum of Hydrogen," communicated by Professor O. W. Richardson, F.R.S.

References to Current Literature

British

OILS.—Travancore essential oils. Part II. Oil from the leaves of *calamintha umbrosa*, Benth. K. L. Moudgill. *J.S.C.I.*, May 23, 1924, pp. 163–164T.

The oil shales of Somerset. W. Forbes-Leslie. *J.S.C.I.*, May 23, 1924, pp. 532–539.

TECHNOLOGY.—The utilisation of low-grade and waste coals in power production. W. S. Coates. *J.S.C.I.*, May 23, 1924, pp. 157–163T.

DYESTUFFS.—The progress of research in the ionamine dyestuffs. A. G. Green and K. H. Saunders. *J. Soc. Dyers and Col.*, May, 1924, pp. 138–141.

COTTON.—Further note on the mechanical powdering of cotton. M. Fort. *J. Soc. Dyers and Col.*, May, 1924, pp. 142–144.

DYEING.—The treatment of waste waters from dyeing processes. S. N. Brown. *J. Soc. Dyers and Col.*, May, 1924, pp. 144–147.

The use of hydrogen gas in dyeing vat colours. F. F. Warshaw. *Dyer*, May 1, 1924, p. 169.

INTERMEDIATES.—Intermediates for ice and developed colours. Phenol and resorcinol. A. J. Hall. *Dyer*, April 1, 1924, pp. 126–127.

Intermediates for developed and ice colours. Metaphenylene and meta-toluylene diamines. A. J. Hall. *Dyer*, May 15, 1924, pp. 188–190.

ACIDS.—The constitution of the thionic acids. Part I. I. Vogel. *Chem. News*, May 23, 1924, pp. 325–327.

SILICA.—Fused silica. R. Paget. *Nature*, May 24, 1924, pp. 748–752.

RUBBER.—A new test for crude rubber. Viscosity in acidified benzene. O. de Vries. *Indiarubber J.*, May 24, 1924, pp. 13–18.

United States

ARTIFICIAL SILK.—Making artificial silk by the cuprammonium process. L. S. Fryer. *Chem. Met. Eng.*, May 12, 1924, pp. 743–748.

REFRACTORIES.—Selection factors in choosing refractories for industrial plant use. Table of physical and chemical properties of refractory materials. O. A. Hougen. *Chem. Met. Eng.*, May 12, 1924, pp. 737–741.

NITROGEN COMPOUNDS.—Nitrogen from coal. H. A. Curtis. *Chem. Met. Eng.*, May 12, 1924, pp. 749–752.

ADSORPTION.—Adsorption by activated sugar charcoal. Part I. Proof of hydrolytic adsorption. E. J. Miller. *J. Amer. Chem. Soc.*, May, 1924, pp. 1150–1158.

Adsorption and surface tension at liquid-liquid interface. J. H. Mathews and A. J. Stamm. *J. Amer. Chem. Soc.*, May, 1924, pp. 1071–1079.

ADDITION COMPOUNDS.—The addition products of methyl-ethyl ketone with chloroform, bromoform and iodoform. J. B. Ekeley and C. J. Klemme. *J. Amer. Chem. Soc.*, May, 1924, pp. 1252–1254.

The addition reactions of certain pentadienones. Part II. Addition of malonic esters. E. P. Kohler and C. S. Dewey. *J. Amer. Chem. Soc.*, May, 1924, pp. 1267–1278.

EVAPORATION.—Studies in evaporator design. Part V. Effect of surface conditions. L. A. Pridgeon and W. L. Badger. *J. Ind. Eng. Chem.*, May, 1924, pp. 474–478.

Evaporator scale formation. W. L. McCabe and C. S. Robinson. *J. Ind. Eng. Chem.*, May, 1924, pp. 478–479.

Heat transmission in an inclined rapid circulation type vacuum evaporator. D. J. Van Marle. *J. Ind. Eng. Chem.*, May, 1924, pp. 458–459.

ACIDS.—Fluosilicic acid. Part III. Method of titrating and properties. C. A. Jacobson. *J. Phys. Chem.*, May, 1924, pp. 506–509.

CHLORIDES.—The formation of phosphorus pentachloride from phosphorus trichloride and chlorine. H. A. Taylor. *J. Phys. Chem.*, May, 1924, pp. 510–513.

SOLUBILITIES.—The solubility of gasoline (hexane and heptane) in water at 25° C. L. H. Milligan. *J. Phys. Chem.*, May, 1924, pp. 494–497.

The supersaturation of gases in water and certain organic liquids. J. Metschl. *J. Phys. Chem.*, May, 1924, pp. 417–437.

BIBLIOGRAPHY.—Patent reference sources. J. F. Smith. *J. Ind. Eng. Chem.*, May, 1924, pp. 527–528.

French

FUEL.—Comparative theoretical study of the principal gaseous fuels from the point of view of lighting and motive power. H. Pariselle. *Chim. et Ind.*, April, 1924, pp. 651–656.

The law of heat compression and the economy of fuel in furnaces. A. Korevaar. *Chim. et Ind.*, April, 1924, pp. 642–650.

SEPARATION.—The separation of complex mixtures and the recuperation of volatile liquids. P. Lemale. *Chim. et Ind.*, April, 1924, pp. 657–661.

ACIDS.—The manufacture of sulphuric acid by Gaillard's method. P. Le Breton. *Chim. et. Ind.*, April, 1924, pp. 662–664.

The manufacture of sulphuric acid by the contact process. Part XXII. Methods of and apparatus for absorption of sulphur trioxide. H. Braidy. *L' Ind. Chim.*, May, 1924, pp. 194–196.

AMMONIA.—A comparison between the various methods for the direct synthesis of ammonia. Part III. Greenwood and de Jahn processes. P. Firmin. *L'Ind. Chim.*, May, 1924, pp. 200–204.

WOOD.—The carbonisation and distillation of wood. Part II. P. Razous. *L'Ind. Chim.*, May, 1924, pp. 204–206.

MAGNESIA.—The rôle of magnesia in agriculture. H. E. Lefevre. *L'Ind. Chim.*, May, 1924, pp. 208–210.

ESTERS.—Synthesis by means of sodamide. Preparation of benzyl α-alkylphenylacetates and the corresponding acids. M. Ramart and A. Haller. *Compt. rend.*, May 12, 1924, pp. 1583–1587.

ALCOHOL.—Anhydrous alcohol and its industrial manufacture. G. Patart. *Bull Soc. d'Encour*, March, 1924, pp. 201–216.

Miscellaneous

COLOUR.—Studies of the chromophore function. Part IX. The quinone chromophore. J. Lifschitz. *Rec. Trav. Chim. des Pays-Bas;* April 15, 1924, pp. 269–282 and May 15, 1924, pp. 403–419.

PEROXIDES.—Furfuroyl peroxide. H. Gelissen and J. D. Van Roon. *Rec. Trav. Chim. des Pays-Bas*, April 15, 1924, pp. 359–366.

The analysis of sodium peroxide. E. Bosshard and E. Farrer. *Helv. Chim. Acta*, May 2, 1924, pp. 486–489.

REACTIONS.—The action of inorganic iodides on αβ-dibromo-compounds. Part I. The mechanism of the reaction. C. F. Van Duin. *Rec. Trav. Chim. des Pays-Bas*, April, 15, 1924, pp. 341–358.

The condensation of isatin with phenylhydroxylamine. H. Rupe and E. Stöcklin. *Helv. Chim. Acta*, May 2, 1924, pp. 557–566.

REDUCTION.—The reduction of citronellal. H. Rupe and R. Rinderknecht. *Helv. Chim. Acta*, May 2, 1924, pp. 541–546.

NITRO COMPOUNDS.—*o*-Nitrotoluene-*p*-sulphonyl-*p*-anisidine and its products of nitration. F. Reverdin. *Helv. Chim. Acta*, May 2, 1924, pp. 567–574.

ANALYSIS.—The practical utility of the potentiometric titration of zinc with ferrocyanide. E. J. Verzijl and I. M. Kolthoff. *Rec. Trav. Chim. des Pays-Bas*, April 15, 1924, pp. 380–388.

The titration of zinc by means of different metallic ferrocyanides. I. M. Kolthoff and E. J. Verzijl. *Rec. Trav. Chim. des Pays-Bas*, April 15, 1924, pp. 389–393.

The estimation of nickel in the presence of iron and cobalt by means of dimethylglyoxime. J. G. Weeldenburg. *Rec. Trav. Chim. des Pays-Bas*, May 15, 1924, pp. 465–473.

The behaviour of oxalic acid as a titration substance. W. D. Treadwell. *Helv. Chim. Acta*, May 2, 1924, pp. 528–534.

OPTICALLY ACTIVE COMPOUNDS.—Some derivatives of α-sulphobutyric acid and the rotory power of their active constituents. H. J. Backer and J. H. de Boer. *Rec. Trav. Chim. des Pays-Bas*, May 15, 1924, pp. 420–433.

The rotation dispersion of camphor. F. Bürki. *Helv. Chim. Acta*, May 2, 1924, pp. 537–440.

Patent Literature

Abstracts of Complete Specifications

214,675. Dry Distillation, De-Gasification or Gasification of Solid Fuels and the Like. O. Hellmann, 9, Schnellstrasse, Bochum, Germany. Application date, December 13, 1922.

The process is for the dry distillation of lignites, peats, coal, coal waste, etc., and is intended to overcome the disadvantage that such substances are bad conductors of heat, so that the heat penetrates into the interior very slowly. In this process the material is charged similar to the mouldings in brick kilns in the form of lattice-like piles composed of blocks with spaces between. This insures a large surface area, so that the heating is more uniform and more rapid, while the distillates are enabled to pass through intermediate spaces and thus avoid decomposition by contact with the hot walls. The charge may be heated directly by hot gases, or indirectly. If the charging material is not in the form of blocks, it may be pressed into blocks with a binding agent such as tar or pitch, or in some cases water. The process is applicable for low-temperature distillation, or high-temperature distillation above 900° C. The blocks may be supported upon a carriage which is introduced bodily into the distillation chamber.

214,699. Brown Coloration in China Clay, Process for the Removal of. L. A. Holden, 75, Oldham Street, Latchford, Warrington. Application date, January 19, 1923.

The brown coloration in china clay, which is due to the presence of hydrated iron oxide, is removed by suspending the china clay in water and treating it with a solution of sodium sulphide. Dilute sulphuric acid is then added gradually till the mixture is nearly neutral. Sulphuretted hydrogen is thus liberated by reaction with the sodium sulphide, and this reacts with the iron hydroxide producing ferrous sulphide. An excess of sulphuric acid is then added to dissolve the ferrous sulphide and precipitate the clay. The operation is carried out in the first settling tanks after the mica drags, and the clay suspension, which should not exceed 4 per cent. clay, is treated with the necessary quantity of sulphide solution and dilute sulphuric acid, with agitation. The mixture is allowed to stand, and then treated with an excess of sulphuric acid and allowed to settle. The liquid is tapped off, and the clay washed several times and then dried. Reference is directed in pursuance of Section 7, Sub-section 4, of the Patents and Designs Acts, 1907 and 1919, to Specifications No. 2,309/1914 and 4,618/1877.

214,733. Purifying Mineral Oils from Sulphur, Process for. The Anglo-Saxon Petroleum Co., Ltd., St. Helens Court, Great St. Helens, London, E.C.3. From E. S. Hillman, c/o Anglo-Egyptian Oilfields, Ltd., The Refinery, Suez, Egypt. Application date, January 27, 1923.

Petroleum, naphtha, or the like containing uncombined sulphur in solution is purified by means of an organic substituted hydrogen sulphide compound or a mercaptide. The mercaptide may be added to the oil to be purified, or the oil may be so refined that a mercaptide is produced in it. When the oil is refined by agitation with an alkali or a metallic salt, or a mixture of these, ethyl mercaptan or a homologue may be added before or during the agitation; or an organic substituted hydrogen sulphide compound may be produced during the treatment. In an example, 10 tons of unrefined benzene is mixed with 1 lb. of ethyl mercaptan and 5 gallons of sodium plumbite solution containing 2 lb. of sodium plumbite per gallon, and agitated for 45 minutes. In this case, a mercaptide is formed by reaction of the mercaptan and the sodium plumbite, or alternatively the mercaptide may be previously produced. In another example, an Egyptian distillate, containing free sulphur and organic substituted hydrogen compounds in excess of the quantity required for eliminating the free sulphur by sodium plumbite, may be mixed with a Persian unrefined benzene containing free sulphur but insufficient organic substituted hydrogen sulphide compounds, and the mixture may then be treated as above to remove the uncombined sulphur.

214,735. Solvent Soaps from Sulphonated Oils, Manufacture of. M. I. Aische, Key Green, Buglawton, Cheshire. Application date, January 29, 1923.

Waxes and greases contained in silk, wool, cotton, etc., have been dissolved in solvents obtained by combining solvents such as tetrachlorethane with a fatty acid or an oil containing a fatty acid. In this invention, sulphonated oils, fats, waxes, etc., are hydrolysed by boiling with water or dilute acids capable of introducing a hydroxy group or groups into the fatty acids, and the mixture is neutralised with a soluble alkali or alkali carbonate to obtain a soap which is a good solvent for natural waxes, greases, and oils. Reference is directed in pursuance of Section 7, Sub-section 4 of the Patents and Designs Acts of 1907 and 1919, to Specifications No. 17,655/1909, 24,837/1908, 8,245/1907, 24,868/1897, 14,430/1891, 12,216/1886, and 1,786/1881.

214,756. Bodies Related to the Acridines, Manufacture of. British Dyestuffs Corporation, Ltd., 70, Spring Gardens, Manchester, W. H. Perkin, and G. R. Clemo, Organic Chemical Laboratory, South Parks Road, Oxford. Application date, February 6, 1923.

It is known that acridine in alcoholic solution may be reduced to dihydro-acridine with sodium amalgam, but the disadvantage of working with acridine is avoided in this invention by using acridone, which is obtainable in large quantities and may be reduced by sodium amalgam and alcohol to dihydro-acridine. Acridone derivatives such as the nitro-acridone may also be used. The dihydro-acridines may be oxidised to acridines by nitrous acid or chromic acid. Thus a solution of dihydro-acridine in glacial acetic acid containing hydrochloric acid is mixed with sodium nitrite, and neutralised with ammonia yielding the theoretical quantity of acridine. An amino-dihydro-acridine in the form of its acetyl- or para-tolyl sulpho-derivative may be oxidised with potassium bichromate in acetic acid solution, and the product hydrolysed to obtain amino-acridine. Detailed examples of these reactions are given.

214,765. Anthraquinone Bodies, Production of. H. A. E. Drescher, J. Thomas, and Scottish Dyes, Ltd., Murrell Hill Works, Carlisle. Application date, February 8, 1923.

The object is to produce amino derivatives of anthraquinone which are difficult to obtain by the recognised processes. It has been found that if halogen derivatives of anthraquinone are treated with an imide of a dibasic acid such as phthalimide in the presence of copper and an acid absorber such as sodium acetate and heated, the halogen is eliminated as acid, and a product formed from the anthraquinone body and the imide. If this product is treated with sulphuric acid, the dibasic acid is regenerated, and an amino derivative of anthraquinone is formed. Amino derivatives may be obtained in this manner from 1-chlor-anthraquinone, 1 : 8-dichlor-anthraquinone, 1-chlor-4-nitro-anthraquinone, 1-chlor-4-oxy-anthraquinone, 1-chlor-5-nitro-anthraquinone. If the imide of the dibasic acid will form a metal salt, this may be used instead of the imide, and an acid absorber is not necessary. In an example, a mixture of 1-chlor-anthraquinone 10 parts, phthalimide 7·5 parts, sodium acetate 5 parts, copper bronze 0.1 parts, and nitrobenzene 12·5 parts, is heated to 200° C. for two hours, and the 1-phthalimide-anthraquinone crystallised out, filtered, washed, and dried, giving a yield of 92 per cent. This product is dissolved in concentrated sulphuric acid, and the mixture heated to 100° C. for one hour and poured into water yielding 1-amino-anthraquinone in a yield of 90 per cent.

Other detailed examples are given of the production of 1 : 5-diphthalimido-anthraquinone from 1 : 5-dichloranthraquinone, and its conversion into 1 : 5-diamino-anthraquinone 1-chlor-5-phthalimido anthraquinone from 1 : 5-dichloranthraquinone, and its conversion into 1-chlor-5-amino-anthraquinone; 1-phthalimido-2-nitro-anthraquinone from 1-chlor-2-nitro-anthraquinone, and its conversion into 1-amino-2-nitro-anthraquinone; 1-amino-2-methyl-4-phthalimido-anthraquinone from 1-amino-2-methyl-4-bromo-anthraquinone, and its conversion into diamino-2-methyl-anthraquinone; 1-methylamino-4-phthalimido-anthraquinone

from 1-methylamino-4-bromo-anthraquinone, and its conversion into 1-methylamino-4-amino-anthraquinone; 1-phthalimido-2-amino-anthraquinone from 1-chlor-2-amino-anthraquinone, and its conversion into 1 : 2-diamino-anthraquinone; 2-phthalimido-anthraquinone from 2-bromo-anthraquinone, and its conversion into 2-amido-anthraquinone, and the preparation of 2-benzoylamido-anthraquinone-2¹-carboxylic acid; and 1-succinimido-anthraquinone from 1-chlor-anthraquinone, and its products of hydrolysis, *e.g.*, 1-amino-anthraquinone.

214,836. *p*-DIALKYLAMINO-ARYLPHOSPHINOUS ACIDS, MANUFACTURE OF. R. B. Ransford, London. From L. Cassella and Co., G.m.b.H., Frankfort-on-Main, Germany. Application date, May 3, 1923.

To obtain *p*-dialkylamino arylphosphinous acids, phosphorus trichloride is mixed with an excess of a tertiary base, and the arylphosphorus chloride is converted into the phosphinous acid or its salt by means of caustic soda lye. In an example, dimethyl-aniline is mixed with phosphorus trichloride and heated gradually on a water bath to 100° C. The product is treated with ice-cold caustic soda lye. The excess of dimethyl aniline is distilled off with steam, and the solution crystallised, yielding the sodium salt of 1-dimethylamino-4-phenyl-phosphinous acid. Other examples are given of the preparation of the sodium salts of 1-dimethylamino-3-methyl-4-phenyl phosphinous acid, and 1-diethylamino-3-methyl-4-phenyl phosphinous acid. These products are used for therapeutic purposes.

214,864. INDIGOID DYESTUFFS AND INTERMEDIATE PRODUCTS, MANUFACTURE OF. O. Y. Imray, London. From Soc. of Chemical Industry in Basle, Switzerland. Application date, June 8, 1923.

α-thionaphthol or a halogen substitution product of α or β-thionaphthol is condensed with oxalyl chloride to form the corresponding thionaphthisatin, and this is condensed with a compound containing a cyclic methylene group capable of reacting. The products are indigoid dyestuffs of various colours, and their properties may be improved by halogenation, or if they contain an amino group, by acidylation. To obtain the halogen thionaphthols, the corresponding amino-naphthalene sulphonic acid is diazotised, and the diazo group replaced by halogen. The halogen naphthalene sulphonic acid obtained is converted into the corresponding sulphonic chloride, which is reduced to the corresponding thionaphthol. Examples are given of the production of 1 : 2-thionaphthisatin, 6-chloro-2 : 1-thionaphthisatin, 1-bromo-2 : 3-thionaphthisatin, and other halogenised thionaphthisatins. Examples are also given of the condensation of these thionapthisatins with substances such as 1 : 2-naphthioindoxyl, oxythionaphthene carboxylic acid, 6-amino-thioindoxyl carboxylic acid, indoxyl carboxylic acid, acenaphthenone, oxythionaphthene carboxylic acid, and others, and also of the halogenation or acidylation of these.

214,866. BENZENE DERIVATIVES CONTAINING CARBON SIDE CHAINS, PARTICULARLY THYMOL, MANUFACTURE OF. Howards and Sons, Ltd., Uphall Works, Ilford, London, and J. W. Blagden, Apple Tree House, Grove Road, South Woodford, London, E.18. Application date, June 12, 1923.

Phenols or their substitution products are converted into compounds containing carbon side chains by treating a sulphonic acid of the phenol or substitution product with an unsaturated hydrocarbon of the olefine series in the presence of strong sulphuric acid. The sulphonic acid groups may be eliminated by hydrolysis. In an example, a mixture of meta-cresol and fuming sulphuric acid is heated to 160° C. for two hours, and then cooled to 100° C. and a current of propylene passed through. The mixture is distilled in steam at 115° C. to 140° C., so that the propyl cresols pass over with the steam. The product is mainly thymol containing some 1 : 3 : 5-isopropyl cresol and 1 : 3 : 4-normal-propyl cresol. The process can be carried out by using commercial olefines which are not of high purity. Other examples are given of the production of isopropyl phenols and ethyl metacresols.

214,871. OILS AND SPIRITS, TREATMENT AND PURIFICATION OF. V. L. Oil Processes, Ltd., and O. D. Lucas, Vickers House, Broadway, Westminster, London. Application date, June 21, 1923.

The process is particularly for the purification of mineral oils and spirits containing unsaturated compounds such as unsaturated hydrocarbons of the aliphatic or aromatic series. The oil is vaporised, and passed together with hydrogen containing a trace, *i.e.*, 1/100 to 1/150 part, of chlorine or bromine, through a chamber containing a filtering or polymerising medium such as floridine or bauxite, or activated charcoal or aluminium oxide. The chamber is heated by an oil bath to 180°-190° C., and the hydrogen and chlorine are dried by strong sulphuric acid and mixed in a light-proof pipe to prevent combination before passing into the chamber. It is found that by this treatment those constituents of a crude spirit boiling above 200° C. are eliminated. The process may be repeated for further purification of the spirit.

NOTE.—Abstracts of the following specifications which are now accepted appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention:—198,328 and 206,862 (Algemeene Norit Maatschappij), relating to a process and apparatus for producing activated carbon, see Vol. IX., p. 129 and Vol. X., p. 73; 200,508 (Naamlooze Vennootschap Vereenigde Fabrieken van Chemische Producten), relating to the production of organic superoxides in a finely divided condition, see Vol. IX., p. 290; 206,809 (Titanium Pigment Co., Inc.), relating to the treatment of titaniferous material, see Vol. X., p. 73.

International Specifications not yet Accepted

213,267. FATS AND FATTY OILS. E. Wecker, Kranenstrasse, Heilbronn-on-Neckar, Germany. International Convention date, March 20, 1923.

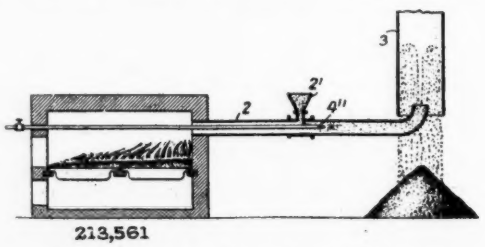
The process is for separating volatile substances such as fatty acids from saponified fats, whale oil, or edible fats or oils, resin oil from resin, and volatile substances from lignite tar, coal gas tar, crude petroleum, etc. The substance is heated under reduced pressure, and water, benzol, toluol, alcohol, etc., are sprayed into it in a current of neutral gas such as carbon dioxide, nitrogen, hydrogen, flue gas, superheated or dry saturated steam. Fat is heated to 220°–280° C. at a pressure of 30–40 mm. of mercury and passed down a packed tower in countercurrent to the steam, etc. The process is applicable for deodorizing fats or oils from which free fatty acids have been removed by treatment with alkali.

213,285. SYNTHETIC DRUGS. Chemische Fabrik von Heyden Akt.-Ges, Radebeul, Dresden, Germany. International Convention date, March 23, 1923.

Antimony oxide is treated with pyrocatechin derivatives containing in the molecule one or more acid groups such as the carboxylic, sulphonic, or arsinic group. In an example, a mixture of the potassium salt of pyrocatechin disulphonic acid and antimony hydroxide are heated, neutralised with caustic potash, filtered and evaporated to isolate the product.

213,561. DRYING MINERALS. W. R. Wade and New York Zinc Co., Inc., Edwards, New York. International Convention date, March 28, 1923.

Zinc oxide, pyrites, etc., may be dried by admitting them from a hopper 2¹ to a furnace flue 2, and admitting compressed air



213,561

through a nozzle 4ᴵᴵ to carry the mineral into the stack 3. The air and furnace gases then expand, and the dried mineral is deposited.

213,531. PURIFYING CRUDE SALTS. Soc. Chimique de la Grande Paroisse (Azote et Produits Chimiques), 13, Rue des Saussaies, Paris. International Convention date, March 29, 1923.

Crude salts or minerals such as rock salt and sylvine which contain argillaceous matter, are washed with a saturated

solution of the same salt, which removes the impurities in suspension. The purified salt may be calcined at 300°–600° C. to render any remaining clay non-colloidal, so that it may be deposited from a solution of the salt. The saturated solution of the salt may be used again after removing the impurities.

213,567. Condensation Products from Formaldehyde and Urea. F. Pollak, 20, Langegasse, Vienna. International Convention date, March 31, 1923.

The first stage of the condensation of formaldehyde with urea, in which water-soluble products are formed, is conducted in two phases, the first in the absence, and the second in the presence of free hydrogen ions. In the first phase, these conditions are obtained by adding a base to render the mixture neutral or slightly alkaline, or by using formaldehyde free from acid. In the second phase, the mixture is further heated after adding an acid, acid salt, acid ester, or a compound such as an ammonium salt which generates acid, or after the formaldehyde has been aerated to produce formic acid. The nature of the colloidal products depends on the concentration of hydrogen ions. With a small concentration, viscous hydrophile products are obtained; with greater concentration, a tough resinous hydrophobe gel is precipitated; and with a concentration above 5×10^{-3}, a brittle, crumbling material is obtained. The hydrophobe gel need not be separated, but with suitable acid conditions remains in pseudo solution. It may be dissolved in solvents such as epichlorhydrin to produce lacquers. In an example, urea and neutral or slightly alkaline formaldehyde are heated with boric acid, and the viscous product may be hardened by heat treatment. The boric acid may be replaced by acetic acid, ammonium acetate, benzoic acid, sulphuric acid or formic acid.

Latest Notifications.

216,098. Process for the manufacture of the arsenates of the alkaline-earth metals. Soc. Chimique des Usines du Rhône May 15, 1923.

216,120. Process for the manufacture of ketones. Soc. Lefranco et Cie. May 17, 1923.

216,129. Process for obtaining hydrochloric acid free from arsenic. Schmidt, Dr. E., and Ges. für Chemische Produktion. May 14, 1923.

216,130. Process for the manufacture of a highly-active decolourising-charcoal. Clemm, Dr. H. Muller-, and Ges. für Chemische Produktion. May 14, 1923.

Specifications Accepted with Date of Application.

194,672. Water-purifying apparatus. E. Declercq. March 10, 1922.

197,655. Ammonia, Process for the synthetic production of. L. Cassale. May 13, 1922. Addition to 194,740.

204,063. Carbon dioxide, Recovery of—from waste gases and the like. E. Ketterer. September 16, 1922.

207,790. Phenols and aldehydes, Process of hardening the products of condensation of. L. Deutsche, I. Thorn, and "Amalith" Chemische Industrie Ges. November 30, 1922.

210,388. Heat-treated zirconium steel, and Processes of making same. Electro-Metallurgical Co. January 25, 1923.

211,494. Rubber and similar materials, Compounding of. Naugatuck Chemical Co. July 13, 1922. Addition to 174,915.

215,400. Reduction of ores, oxides, and the like. H. E. Coley. Nov. 10, 1922.

215,439. Copper ores, Treatment of. W. J. Mellersh-Jackson. (*A. A. Ossa*). February 7, 1923.

215,463. Fertilising material, Process for production of. C. P. Christensen. February 13, 1923.

215,470. Ammonia compounds, Manufacture of. J. H. West and A. Jaques. February 16, 1923.

215,615. Coal slimes and ores, Apparatus for refining or concentrating—in accordance with the froth flotation process. J. S. Withers. (*Vereenigde Kolenmaatschappijen ter Voortzetting der Steenkolenzaken Gedreven door de Naamlooze Vennootschappen Furness' Kolenmaatschappij en Hoven en Henny's Handelmaatschappij*). June 18, 1923.

215,622. Froth over the surface of a liquid, Means for skimming off. A. A. Thornton. (*Vereenigde Kolenmaatschappijen ter Voorzetting der Steenkolenzaken Gedre-ven door de Naamlooze Vennootschappen Furness' Kolenmaatschappij en Heven en Henny's Handelmaatschappij*). June 23, 1923.

Applications for Patents

Amber Size and Chemical Co., Ltd. Production of aluminium compounds for paper making, etc. 12,736. May 23. (Germany, July 2, 1923.)

Babcock and Wilcox Co. Refractory product. 12,299. May 19. (United States, May 25, 1923.)

Babcock and Wilcox Co. Kaolin refractory. 12,300. May 19 (United States, May 25, 1923.)

Badische Anilin- and Soda-Fabrik. Manufacture of liquid fuels. 12,697. May 23. (Germany, January 14.)

Badische Anilin- and Soda-Fabrik and Johnson, J. Y. Manufacture of organic compounds. 12,794. May 24.

Badische Anilin- and Soda-Fabrik. Manufacture of black vat dyestuffs. 12,795. May 24.

Blagden, J. W., and Howard and Sons, Ltd. Making synthetic menthol. 12,520. May 21.

Bloxam, A. G., and Chemische Fabrik Griesheim-Elektron. Manufacture of coloured cellulose-ester varnishes. 12,283. May 19.

Brandwood, J. Water-softening apparatus. 12,561. May 22.

Brandwood, J., and Brandwood, T. Filtering-apparatus for liquids. 12,562. May 22.

Chemical Engineering and Wilton's Patent Furnace Co., Ltd., Wilton, N., and Wilton, T. O. Manufacture of sulphate of ammonia. 12,508. May 21.

Chemische Fabrik Griesheim-Elektron. Manufacture of azo dyestuffs. 12,626. May 22. (Germany, May 22, 1923.)

Clemm, H. Müller-, and Ges. für Chemische Produktion. Manufacture of decolorising charcoal. 12,268. May 19. (Germany, July 5, 1923.)

Coke, B. E., and Maxted, E. B. Catalytic oxidation of paraffin hydrocarbons. 12,654. May 23.

Day, F. Dyeing-machine. 12,670. May 23.

Farbwerke vorm. Meister, Lucius, and Brüning. Manufacture of vat dyestuffs. 12,625. May 22. (Germany, August 21, 1923.)

Harris, J. E. G., and Morton Sundour Fabrics, Ltd. Dyeing. 12,733. May 23.

Höganäs-Billesholms Aktiebolag. Production of aluminium oxide. 12,566. May 22. (Sweden, June 15, 1923.)

Imray, O. Y., and Soc. of Chemical Industry in Basle. Manufacture of indigoid dyestuffs. 12,284. May 19.

Lilienfeld, L. Manufacture of cellulose compounds. 12,627, 12,628. May 22. (Austria, April 4.)

Lilienfeld, L. Process of making cellulose combinations. 12,629. May 22. (Austria, April 4.)

Lilienfeld, L. Process of improving vegetable textile materials. 12,630, 12,631. May 22. (Austria, April 4.)

Mandowsky, E. Manufacture of sulphur-containing casting compounds. 12,619. May 22. (Germany, June 13, 1923.)

Menke, J. B. Production of nitrated organic compounds. 12,747. May 23.

Robinson, C. S. Production of oxides of sulphur. 12,730. May 23.

Russell, F. J., and R. Production of colloidal sulphur. 12,707. May 23.

Slate, T. B. Converting carbon dioxide into a solid. 12,715. May 23.

Soc. Chimique des Usines du Rhône. Catalysts. 12,295. May 19. (France, July 26, 1923.)

Ueter, H. Manufacture of lacquers, paints, etc. 12,802. May 24. (Germany, May 28, 1923.)

An Alleged Absorbent of Carbon Monoxide

Investigation of a certain chemical compound, the spraying of which in garages was claimed to reduce the danger of carbon monoxide poisoning from exhaust automobile gases, made by the chemists of the U.S. Department of the Interior at the experiment station of the Bureau of Mines in Pittsburgh, have failed to substantiate the claims of the manufacturers. In its investigations relative to reducing the hazards of carbon monoxide poisoning, the Bureau of Mines recently had its attention drawn to this compound which is sold under a trade name. The advertising matter issued by the manufacturers claims that the compound "holds chlorine and oxygen gases in solution with formaldehyde, which unites with the hydrogen to form hydrochloric acid, giving an over-supply of oxygen which burns up carbon just as a piece of wood is burned in the fire. The formaldehyde in the composition of the compound has a great affinity for ammonia and hydrogen sulphide gases."

In order to test the merits of the compound, some of the product was obtained by the Bureau of Mines and analysed for its power to absorb, oxidize or destroy carbon monoxide. No indication was found, however, of a decrease in the carbon monoxide content or a perceptible increase in the amount of oxygen through the agency of the compound solution. In the apparatus used the volume of compound per unit-volume of carbon monoxide was far in excess of that which would be practical, according to the directions given, to obtain through the use of the compound in a garage. The contact between the solution and the carbon monoxide was much more intimate, and the concentration of the compound vapours was more concentrated than would prevail in ordinary use.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

London, May 29, 1924.

BUSINESS during the current week has been quietly steady, and there have been no special features. The tendency is fairly healthy and prices on the whole are steady. Export trade continues quiet.

General Chemicals

ACETONE is scarce for spot delivery and higher prices are being paid, stocks are light.

ACID ACETIC has been a better market and is without change in value.

ACID CITRIC continues firm with an upward tendency.

ACID FORMIC remains scarce and the price is firm for forward.

ACID LACTIC has been in good demand and the price is steady.

ACID OXALIC seems a shade steadier although the demand is still distinctly poor.

BARIUM CHLORIDE is strong and there has been an extremely active business passing, both for home trade and for export.

COPPER SULPHATE is without change in value and only a relatively small business passing.

CREAM OF TARTAR maintains its higher level and is well called for.

FORMALDEHYDE is steady at the recent lower figure but demand is small.

LEAD ACETATE continues firm and in active request.

METHYL ALCOHOL is very weak and a further decline is not unlikely.

POTASSIUM CARBONATE and CAUSTIC.—Only a small business is being transacted at unchanged figures.

POTASSIUM PERMANGANATE.—Quiet and price easy.

POTASSIUM PRUSSIATE.—The demand has slightly improved but this has had no effect on the price.

SODIUM ACETATE continues scarce and firm.

SODIUM BICHROMATE continues active at British makers' figures.

SODIUM HYPOSULPHITE is in fair demand, especially for photographic quality.

SODIUM NITRITE.—Only a moderate business is reported, but price is firm.

SODIUM SULPHIDE is more active.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID.—A steady business at recent values is reported.

BARBITONE is lower.

BROMIDES.—The demand is poor with ammonia slightly easier.

EUCALYPTUS OIL is nominal, there being practically no inquiry.

GUAIACOL is easier.

HEXAMINE.—Some holders are inclined to cut prices, but the undertone is steady.

MILK SUGAR.—Most makers are sold well ahead. Quotations vary considerably, the leading brands commanding a substantial premium over the general market quotations.

PHENACETIN has been in good demand, the delay in fresh supplies coming to hand tending to harden the market.

PHENAZONE is in buyers' favour.

SODA SALICYLATE.—A fair business has been passing.

VANILLIN continues firm.

Coal Tar Intermediates

Trade during the last week has been moderate in this market with fair inquiry for one or two particular lines, while prices continue steady.

ALPHA NAPHTHOL shows a fair interest.

ALPHA NAPHTHYLAMINE.—A moderate business is passing.

ANILINE OIL AND SALT are of interest chiefly on export account.

BENZIDINE BASE is in fair demand at recent quoted prices.

BETA NAPHTHOL has been inquired for on export account.

DIMETHYLANILINE is quieter without change in value.

"H" ACID continues in fair request for home trade.

NITRO BENZOL is without change.

PARANITRANILINE has been inquired for in the home market.

"R" SALT is quieter than of late.

RESORCINE is of interest on home account, and the price is steady.

XYLIDINE is only in small demand.

Coal Tar Products

There is very little change to report in the market for coal tar products since last week.

90 PER CENT. BENZOL is steady at 1s. 6d. to 1s. 7d. per gallon on rails.

PURE BENZOL remains quiet at 1s. 11d. per gallon on rails.

CREOSOTE OIL is a little weaker, being worth about 7d. per gallon on rails in the North, and in London from 8¼d. to 8½d. per gallon.

CRESYLIC ACID is a little firmer, and is offered at from 2s. 0½d. to 2s. 1d. per gallon on rails in the north for the pale quality 97/99 per cent. The dark quality 95/97 per cent. is not in great demand, being quoted at 1s. 9d. per gallon.

SOLVENT NAPHTHA remains very firm at 1s. 3d. per gallon on rails.

HEAVY NAPHTHA is worth from 1s. 2d. to 1s. 3d. per gallon on rails.

NAPHTHALENE is quiet, the drained salts being offered fairly freely at £6 to £6 10s. per ton, and 74/76 melting point at about £7 per ton. The higher quality, 76/78 melting point remains firm at about £8 per ton.

PITCH.—Business is still very limited and quotations remain unchanged.

Sulphate of Ammonia

SULPHATE OF AMMONIA.—The demand is improving.

Scientific Misapprehensions

AT the annual dinner of the British Science Guild on Thursday, May 22, Lord Sumner, proposing the toast of "Science and the Empire," said that the Society, among other purposes, sought to introduce scientific methods, scientific seriousness, scientific truth and scientific disinterestedness into the British Empire. It was an enormous task, and he wished it well in that noble crusade. If they could get rid of some of the misapprehensions which many people seemed to entertain about science, how excellent it would be. Most people seemed to think that applied science was bound up with progress, and that every scientific advance led to some better land. He hoped the guild would be able to get that out of people's minds. He hoped another text they would preach to the British Empire was that there was nothing so unscientific as waste, and that there was nothing, not even original sin, to which humanity was more prone. The only thing which might with advantage be unsparingly spent was personal effort.

New Professor of Agricultural Chemistry

THE Council of Leeds University on Wednesday elected Dr. Norman Comber to the Chair of Agricultural Chemistry in the University, which has been vacant since the retirement of Professor Charles Crowther, who is now Principal of the Harper Adams Agricultural College. Dr. Comber joined the staff of the University in 1913, and for some time past has held an appointment as Lecturer in Agricultural Chemistry. Recently he has also acted as Advisory Chemist under the Ministry of Agriculture's scheme for providing technical advice to farmers. Before coming to Leeds he was on the staff of the East Anglian Institute of Agriculture, Chelmsford.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	75	0	0	to	80	0	0
Acetone, pure	ton	100	0	0	to	101	0	0
Acid, Acetic, glacial, 99–100%	ton	71	0	0	to	73	0	0
Acetic, 80% pure	ton	47	10	0	to	48	10	0
Acetic, 40% pure	ton	24	0	0	to	24	10	0
Arsenic, liquid, 2000 s.g.	ton	85	0	0	to	88	0	0
Boric, commercial	ton	48	0	0	to	52	0	0
Carbolic, cryst. 39–40%	lb.	0	0	7¾	to	0	0	8
Citric	lb.	0	1	5¾	to	0	1	6
Formic, 85%	ton	61	0	0	to	63	0	0
Hydrofluoric	lb.	0	0	7	to	0	0	8
Lactic, 50 vol.	ton	37	0	0	to	39	0	0
Lactic, 60 vol.	ton	43	0	0	to	45	0	0
Nitric, 80 Tw.	ton	23	0	0	to	25	0	0
Oxalic	lb.	0	0	5	to	0	0	5½
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9½	to	0	2	0
Sulphuric, 92–93%	ton	5	0	0	to	6	0	0
Tannic, commercial	lb.	0	1	9	to	0	2	0
Tartaric	lb.	0	1	1½	to	0	1	2
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	23	0	0	to	24	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	7	10	0	to	8	10	0
Sulphate, 17–18%	ton	8	10	0	to	9	10	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	30	0	0	to	32	0	0
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	32	0	0	to	33	0	0
Nitrate (pure)	ton	40	0	0	to	45	0	0
Phosphate	ton	63	0	0	to	65	0	0
Sulphocyanide, commercial 90%	lb.	0	1	5	to	0	1	6
Amyl acetate, technical	ton	260	0	0	to	280	0	0
Arsenic, white powdered	ton	60	0	0	to	61	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	61	0	0	to	63	0	0
Chloride	ton	14	0	0	to	14	10	0
Nitrate	ton	37	0	0	to	40	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	0	0	to	10	10	0
Borax crystals, commercial	ton	25	0	0	to		—	
Calcium acetate, Brown	ton	13	0	0	to	14	0	0
Grey	ton	19	0	0	to	20	0	0
Carbide	ton	13	0	0	to	13	10	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	80	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	24	0	0	to	24	10	0
Cream tartar, 98–100%	ton	83	0	0	to	85	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	61	0	0	to	62	0	0
Formusol (Rongalite)	lb.	0	1	11	to	0	2	0
Glauber salts commercial	ton	4	0	0	to	4	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal.	0	1	10	to	0	2	0
Iron perchloride	ton	20	0	0	to	22	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	49	10	0	to	50	0	0
Carbonate (White Lead)	ton	50	0	0	to	52	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	50	0	0	to	51	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	4	0	0	to	4	5	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	5	15	0	to	6	0	0
Sulphate (Druggists')	ton	9	0	0	to	10	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	48	0	0
Methyl acetone	ton	80	0	0	to	82	0	0
Alcohol, 1% acetone	ton	76	0	0	to	78	0	0
Nickel sulphate, single salt	ton	37	0	0	to	38	0	0
Ammonium sulphate double salt	ton	37	0	0	to	38	0	0
Potash, Caustic	ton	32	0	0	to	33	0	0
Potassium bichromate	lb.	0	0	5¾	to		—	
Carbonate, 90%	ton	30	0	0	to	31	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3½	to		—	
Metabisulphite, 50–52%	ton	63	0	0	to	65	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	7¾	to	0	0	8
Prussiate, red	lb.	0	1	9	to	0	2	0
Prussiate, yellow	lb.	0	0	8½	to	0	0	9
Sulphate, 90%	ton	10	0	0	to	10	10	0
Salammoniac, firsts	cwt.	2	5	0	to		—	
Seconds	cwt.	2	7	6	to		—	
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to		—	
Bisulphite, 60–62%	ton	20	0	0	to	22	0	0
Chlorate	lb.	0	0	2¾	to	0	0	3
Caustic, 70%	ton	17	10	0	to	18	0	0
Caustic, 76%	ton	18	10	0	to	19	0	0
Hydrosulphite, powder	lb.	0	1	6	to	0	1	7
Hyposulphite, commercial	ton	10	0	0	to	10	10	0
Nitrite, 96–98%	ton	28	0	0	to	29	0	0
Phosphate, crystal	ton	15	0	0	to	15	10	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	5	to	0	0	5¼
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62%	ton	15	0	0	to	16	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	0	11	to	0	1	0
Tin perchloride, 33%	lb.	0	1	4	to	0	1	5
Perchloride, solid	lb.	0	1	5	to	0	1	6
Protochloride (tin crystals)	lb.	0	1	8	to	0	1	10
Zinc chloride 102° Tw.	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	14	0	0	to	15	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	4	to	0	3	6
Acetanilid	lb.	0	2	4	to	0	2	6
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	9	to	0	3	0
Salicylic, B.P.	lb.	0	1	10	to	0	2	0
Tannic, leviss	lb.	0	3	0	to	0	3	3
Amidol	lb.	0	8	6	to	0	9	0
Amidopyrin	lb.	0	13	6	to	0	14	0
Ammon ichthosulphonate	lb.	0	1	10	to	0	2	0
Barbitone	lb.	0	14	6	to	0	15	0
Beta naphthol resublimed	lb.	0	3	6	to	0	4	0
Bromide of ammonia	lb.	0	0	10	to	0	0	11
Potash	lb.	0	0	8	to	0	0	8½
Soda	lb.	0	0	8½	to	0	0	9
Caffeine, pure	lb.	0	12	0	to	0	12	6
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	1	6	to	0	1	9
Calomel	lb.	0	3	9	to	0	4	0
Chloral hydrate	lb.	0	3	10	to	0	4	0
Cocaine alkaloid	oz.	1	0	0	to	1	2	6
Hydrochloride	oz.	0	17	0	to	0	17	6
Corrosive sublimate	lb.	0	3	3	to	0	3	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	2	0	to	0	2	2
B.P. (75–80% eucalyptol)	lb.	0	2	1	to	0	2	3
Guaiacol carbonate	lb.	0	11	9	to	0	12	0
Liquid	lb.	0	10	6	to	0	11	0
Pure crystals	lb.	0	11	0	to	0	11	6
Hexamine	lb.	0	3	9	to	0	4	0
Hydroquinone	lb.	0	4	6	to	0	5	0
Lanoline anhydrous	lb.	0	0	8	to	0	0	9
Lecithin ex ovo	lb.	1	5	0	to	1	7	6
Lithi carbonate	lb.	0	9	9	to	0	10	3
Methyl salicylate	lb.	0	2	6	to	0	2	9
Metol	lb.	0	11	6	to	0	13	6
Milk sugar	cwt.	3	17	6	to	4	5	0
Paraldehyde	lb.	0	1	5	to	0	1	7
Phenacetin	lb.	0	6	0	to	0	6	6
Phenazone	lb.	0	7	6	to	0	8	0
Phenolphthalein	lb.	0	7	3	to	0	7	6
Potassium sulpho guaiacolate	lb.	0	6	3	to	0	6	9
Quinine sulphate, B.P.	oz.	0	2	3	to		—	

	Per	£	s.	d.		£	s.	d.
Resorcin, med cinal	lb.	0	5	6	to	0	6	0
Salicylate of soda powder	lb.	0	2	4	to	0	2	6
Crystals	lb.	0	2	6	to	0	2	9
Salol	lb.	0	4	0	to	0	4	3
Soda Benzoate	lb.	0	2	9	to	0	3	0
Sulphonal	lb.	0	16	0	to	0	16	6
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	12	0	to	0	12	3
Soda salicylate	lb.	0	8	6	to	0	9	0
Vanillin	lb.	1	5	6	to	1	8	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	1	9	to	0	2	0
Refined	lb.	0	2	3	to	0	2	6
Alphanaphthylamine	lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra	lb.	0	0	8½	to	0	0	8¾
Salts	lb.	0	0	9	to	0	0	9¼
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	9	to	0	3	0
Benzidine, base	lb.	0	4	4	to	0	4	7
Sulphate	lb.	0	3	4	to	0	3	7
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	10	to	0	0	11
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	3	to	0	1	4
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	8	to	0	2	10
Diphenylamine	lb.	0	3	0	to	0	3	3
H-Acid	lb.	0	4	3	to	0	4	6
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	4	to	0	2	6
Naphthionate of Soda	lb.	0	2	4	to	0	2	6
Naphthylamine-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	9	to	0	0	10
Paranitraniline	lb.	0	2	6	to	0	2	8
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin, technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	9	to	0	0	10
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.		£	s.	d.
Anise	c.i.f. 2/6, spot	0	2	5
Bay		0	10	6
Bergamot	firmer	0	18	0
Cajuput		0	3	3
Camphor, white	per cwt.	3	10	0
Brown	,,	3	10	0
Cassia	c.i.f. 7/0, spot	0	7	9
Cedarwood		0	1	9
Citronella (Ceylon)	quiet, c.i.f. 3/5, spot	0	3	7
(Java)	dearer, c.i.f. 5/2, spot	0	5	4½
Clove		0	7	0
Eucalyptus		0	2	1
Geranium Bourbon	dearer	1	16	0
Lavender		1	10	0
Lavender Spike		0	5	6
Lemon		0	3	6
Lemongrass	per lb.	0	3	7
Lime (distilled)		0	5	3
Orange sweet (Sicilian)		0	13	0
(West Indian)		0	10	6

		£	s.	d.
Palmarosa		0	18	0
Peppermint (American)		1	1	0
Mint (dementholised Japanese)	easier	0	16	0
Patchouli		1	2	6
Otto of Rose	per oz.	1	15	0
Rosemary		0	1	9
Sandalwood		1	5	0
Sassafras		0	9	6
Thyme	4/6 to	0	5	6

Synthetics.				
Benzyl acetate	per lb.	0	3	6
Benzoate	,,	0	3	6
Citral	,,	0	10	0
Coumarine	,,	1	0	0
Heliotropine	,,	0	8	0
Ionone	,,	1	5	0
Linalyl acetate	,,	1	12	6
Methyl salicylate	,,	0	2	6
Musk xylol	,,	0	18	0
Terpeniol	,,	0	2	6

Lake Magadi Soda

West African Deposits of Natural Soda

In view of the recent interest in the affairs of the Magadi Soda Co. and the rumours which have been current concerning the interest taken by Brunner, Mond and Co. in the natural assets of the concern, the recently issued report of the United States Consul at Nairobi is of some value, particularly as it contains an impartial description of the site. The lake, states the report, is situated 100 miles south-west of Magadi Junction, a station on the Uganda Railway, British East Africa. It has a surface of about 34 square miles and over the entire surface of the lake is a crust of bicarbonate and carbonate of soda. This crust is very dense in texture and so hard that automobiles can be driven over it. The thickness of the crust varies at different points on the surface, but nowhere is it less than 3 ft.

Looking out over it, the lake has the appearance of frozen snow, and gives the characteristic crunch of hard frozen snow when it is stepped on. As a fitting background to this impressive spectacle the steep, rugged hills of that country rise on every side.

Extracting the Soda

Until recently the soda was cut by hand and transported in wheelbarrows to the factory, but a modern harvester in the shape of a gold dredger was put into operation about June, 1923. This dredger has buckets with manganese steel edges that cut the soda easily. This material is pumped with a mixture of lake water to the factory at a rate which has been 8 tons per hour but which has been greatly increased by the recent installation of a new pump. At present the pipe from dredge to factory is nearly a mile long.

The mixture of material is almost black in colour and is pumped into conical vats, from the top of which the water flows back to the lake, the soda settling to the bottom. The crystals are washed with water on special trays and are then spread out on the floor of the factory to dry. The final drying is carried out in a calciner fired with fuel oil, from which it emerges as soda ash and is ready for the mechanical bagging machine. The plant capacity is in the neighbourhood of 200 tons of soda ash per day, with prospects for an immediate increase to nearly double that amount. Finally, the material is moved economically to the coast by rail and loaded on steamers for export at Mombasa.

As regards the market for this soda it is still in process of development, but already Japan consumes large quantities of material from this source, while Sweden, Norway, Belgium and England have all received shipments. The Magadi Soda Co. controlled the Sun Soda Co., Ltd., in Japan, which acted as distributor. Shipment is usually made in 100-ton lots that are sold in transit. The fuel oil for calcination was obtained from the Shell Transport Co., in which Sir Marcus Samuels (Lord Bearsted) and Samuel Samuels have large interests. The latter had a controlling interest in the old Magadi Soda Co.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, May 29, 1924.

BUSINESS in the heavy chemical market remains poor, what little inquiry there is being in nearly every case for small quantities.

Prices for home manufactured articles are steady, with Continental offers showing slight increases in some articles.

Industrial Chemicals

ACID ACETIC.—Prices remain unchanged. Glacial, 98/100% now quoted £61 to £69 per ton; 80% pure, £49 to £51 per ton; 80% technical, £46 to £48 per ton. All packed in casks, delivered c.i.f. U.K. port, duty free.

ACID BORACIC.—Crystals or granulated, £48 per ton; powdered, £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—In little demand. Price further reduced to about 7d. per lb., carriage paid, or f.o.b. U.K. port.

ACID CITRIC, B.P. CRYSTALS.—Moderate inquiry. Quoted 1s. 6¼d. per lb., less 5% ex store spot delivery. Offered for early delivery at 1s. 5¾d. per lb., less 5%, ex wharf.

ACID FORMIC, 85%.—Quoted £63 per ton, ex store. 80% quality on offer at £57 10s. per ton, ex store, spot delivery.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC, 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Spot material quoted 4¾d. per lb., ex store. Offered from the Continent at about 4¼d. per lb., c.i.f. U.K. port.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Inclined to be higher at about 1s. 2½d. per lb., less 5%, ex store. Offered for early delivery at 1s. 1½d. per lb., less 5%, ex wharf.

ALUMINA SULPHATE, 17/18%, IRON FREE.—Quoted £7 15s. per ton, ex store, spot delivery. Offered for early delivery at about £7 2s. 6d. per ton c.i.f., U.K. port.

ALUM CHROME.—Ammonium chrome alum quoted £19 to £21 per ton according to quality, f.o.b. U.K. port. Potash chrome alum of English manufacture about £26 5s. per ton, ex store. Continental potash chrome alum offered at about £25 10s. per ton, c.i.f. U.K. port.

ALUM POTASH (LUMP).—Now on offer at £10 10s. per ton, ex store, spot delivery. Quoted £9 5s. per ton, c.i.f. U.K. port.

AMMONIA ANHYDROUS.—Unchanged at about £1s. 5½d. per lb., ex station, prompt delivery.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5 cwt. casks delivered U.K.

AMMONIA LIQUID, 880°.—Unchanged at 2½d. to 3d. per lb. delivered, according to quantity. Containers extra.

AMMONIA MURIATE.—Grey galvanisers, quality unchanged, at about £30 per ton, ex station. Fine white crystals quoted £25 per ton, c.i.f. U.K. port, prompt shipment.

AMMONIA SULPHATE.—25¼%, £13 12s. per ton; 25¾%, neutral quality, £14 15s. per ton, ex works, prompt delivery.

ARSENIC, WHITE POWDERED.—In little demand. On offer for early delivery at about £52 10s. per ton, ex wharf. Continental material quoted £49 per ton, c.i.f. U.K. port.

BARIUM CARBONATE, 98/100%.—Continental material offered at £11 5s. per ton, c.i.f. U.K. port, prompt shipment.

BARIUM CHLORIDE, 98/100%.—English material unchanged at about £14 per ton, ex store. Offered from the Continent at about £13 5s. per ton, c.i.f. U.K. port.

BARYTES.—Finest English white quoted £5 5s. per ton, ex works. Continental about £5 per ton, c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots £11 per ton, ex station. Contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystal, £25 per ton; powdered, £25 per ton, carriage paid, U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s.6d. per ton, ex station. Continental advanced to about £5 5s. per ton, c.i.f. U.K. port.

COPPERAS, GREEN.—Unchanged at about £2 5s. per ton, f.o.b. U.K. port in bulk. Quoted £3 5s. to £3 10s. per ton in casks.

COPPER SULPHATE.—Moderate inquiry for export. Quoted £23 5s. per ton, f.o.b. U.K. port.

FORMALDEHYDE, 40%.—Spot lots now available at about £61 per ton, ex store.

GLAUBER SALTS.—English material quoted £4 per ton, ex store or station. Continental on offer at about £3 10s. per ton, c.i.f. U.K. port.

LEAD, RED.—Continental material quoted £35 10s. per ton, ex store.

LEAD, WHITE.—Quoted £42 per ton, ex store, spot delivery.

LEAD, ACETATE.—White crystals offered from the Continent at £47 10s. per ton, c.i.f. U.K. port; brown crystals about £43 10s. per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—English ground material offered at £8 per ton, ex station. Moderate inquiry for export.

MAGNESIUM CHLORIDE.—Quoted £4 per ton, ex store, spot delivery. Offered from the Continent at about £3 7s. 6d. per ton, c.i.f. U.K. port.

MAGNESIUM SULPHATE (EPSOM SALTS).—English material, commercial quality, on offer at about £5 per ton, ex store. B.P. quality quoted £6 5s. per ton, ex station.

POTASH, CAUSTIC, 88/92%.—Quoted £29 10s. per ton, c.i.f. U.K. port, prompt shipment from the Continent. Spot lots available at about £31 10s. per ton, ex store.

POTASSIUM, BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE.—96/98% quoted £24 10s. per ton; 99/100%, £30 15s. per ton; 90/94%, £22 15s. per ton, all delivered c.i.f. U.K. port, prompt shipment from the Continent. Spot lots of 96/98% quality on offer at about £26 15s. per ton, ex store.

POTASSIUM CHLORATE.—Moderate inquiry quoted 3½d. per lb., ex store.

POTASSIUM NITRATE (SALTPETRE).—Quoted £27 10s. per ton, c.i.f. U.K. port, prompt shipment. Spot lots unchanged at about £30 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 8¾d. per lb. ex store, spot delivery. Offered from the Continent at 7¼d. per lb., c.i.f. U.K. port.

POTASSIUM PRUSSIATE (YELLOW).—Spot lots quoted 8¼d. per lb., ex store.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62% broken, £19 2s. 6d. per ton; 98/99% powdered, £22 15s. per ton. All ex station, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—In little demand. Quoted £25 7s. 6d. per ton, ex store. Offered from the Continent at about £23 15s. per ton, c.i.f. U.K. port.

SODIUM BICARBONATE.—Refined re-crystallised quality £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—English makers' prices unchanged at 4¼d. per lb. d/d.

SODIUM CARBONATE.—Soda Crystals, £5 to £5 5s. per ton, ex quay or station. Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material quoted £10 per ton ex station. Continental on offer at slightly less. Pea crystals of English manufacture quoted £13 15s. per ton, ex station.

SODIUM NITRATE.—Refined, 96/98% quality unchanged at about £13 17s. 6d. per ton, f.o.r. or f.o.b. U.K. port.

SODIUM NITRITE, 100%.—Moderate inquiry. Price about £28 per ton, f.o.b. U.K. port.

SODIUM PRUSSIATE (YELLOW).—English material quoted 4¼d. per lb., f.o.b. U.K. port. Continental offered at slightly less, c.i.f. U.K. port.

SODIUM SULPHATE (SALTCAKE).—Price for home consumption, £3 10s. per ton, carriage paid buyers' stations. Quoted 65s. per ton, f.o.b. U.K. port for export.

SODIUM SULPHIDE.—60/65% solid, English make £14 15s. per ton, ex station; broken, £1 per ton more; flake, £2 per ton more; 60/62%, solid, offered from the Continent at £12 10s. per ton, c.i.f. U.K. port; broken, £1 per ton more; 31/34% crystals, English make, £9 2s. 6d. per ton, ex station; 30/32% crystals, Continental make, £8 12s. 6d. per ton, c.i.f. U.K. port.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

ZINC CHLORIDE, 98/100%.—Quoted £26 15s. per ton, f.o.b. U.K. port.

ZINC SULPHATE.—English material quoted £13 10s. per ton, ex station. Offered from the Continent at about £11 per ton, c.i.f. U.K. port.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

BETA NAPHTHALENE SULPHONIC ACID.—Small home inquiry. Price 9d. lb., 100% basis delivered.

BENSALDEHYDE.—Some home inquiries. Price 2/4½d. lb. delivered.

BENZOL, PURE.—Good supplies. Price 1s. 10d. gallon delivered.

CREOSOTE OIL.—Market weak. Price 7d. gallon, ex works.

DIPHENYLAMINE.—Good home inquiry. Price 3s. lb. delivered.

DINITROBENZOL.—Some export inquiry. Price 10d. lb. f.o.b.

DIMETHYLANILINE.—Small home inquiry. Price 2s. 4d. lb. delivered.

NAPHTHIONIC ACID.—Some home inquiry. Price 2s. 4d. lb. 100 per cent. basis.

PARA NITRANILINE.—Small home inquiry. Price 2s. 5d. delivered.

TOLUOL, PURE.—Steady at 1s. 10d. gallon, ex works.

SOLVENT NAPHTHA.—Price 1s. 4d. gallon, ex works.

Catalogues Received

AN ART BOOKLET giving illustrated practical notes on the correct methods of welding cast iron by the acetylene process has been issued by the Suffolk Iron Foundry (1920), Ltd., of Stowmarket, who specialise in the production of welding rods for this material. The booklet also includes illustrations of some examples of typical welding repairs, and data concerning various sizes of welding rods.

THE "BENN" friction clutch and its accessories are dealt with in an artistically produced catalogue which has just been issued by the makers, THOMAS BROADBENT & SONS, LTD., of Huddersfield. These clutches can be supplied in a variety of types suitable for transmitting horse-powers from 1 up to 5,000, and adaptable for use as a shaft coupling, or with belt, rope, chain or gear drives, with either high or low speed engagement. Those interested in works practice will find much of value in this 24-page catalogue.

THE BRITISH DRUG HOUSES, LTD., of Graham Street, City Road, London, has re-issued their price list of chemical products including organic and inorganic chemicals, test solutions, analytical reagents, microscope stains, etc., amounting to some 3,000 different substances in all. A slip attached to the catalogue states that the next issue will be in January, 1925, so that meanwhile the present edition should prove valuable to all who require fine chemicals of any kind, though, of course, certain products are subject to market fluctuations.

A LARGE cloth-bound volume of some 450 pages on heavy art paper forms the latest general catalogue of BELL'S UNITED ASBESTOS CO., LTD., of Southwark Street, London, S.E.1, which deals with asbestos and engineering supplies. Particulars and prices are given of asbestos sheet, cloth, steam packings, pipe laggings, clutch facings, etc.; other sections of the catalogue deal with an immense variety of engineers' sundries, boiler fittings, valves, tools, and so on. Pumps and boilers are also listed, and concluding sections deal with "Poilite" and "Everite" building materials. In addition there is useful index and tables of various constants and figures relating to engineering practice.

The Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT.]

Manchester, May 29, 1924.

BUSINESS on the chemical market here during the past week has shown no new features to distinguish it from any of its predecessors during the last month or two. The lack of confidence on the part of buyers is reflected in the nature of the orders that are being placed, the general policy apparently being as far as possible to supply only day-to-day requirements. The export demand, also, is on a limited scale. One or two minor concessions have been made since my last report.

Heavy Chemicals

Saltcake is maintained at £3 10s. per ton for home consumption and £3 f.o.b. for export; the demand continues on a small scale. Prussiate of soda is quiet and easy at 4¼d. to 4½d. per lb. Chlorate of soda also meets with only a restricted inquiry and quotations are weak at 2½d. to 2¾d. per lb. Sulphide of sodium is steady and in limited request at £14 10s. to £14 15s. per ton for 60–65 per cent. concentrated solid and £9 10s. for crystals. Nitrite of soda is maintained at last week's level of £28 per ton. Bleaching powder is steady and in moderate demand at £10 per ton. Glauber salts are on offer at £3 10s. per ton, but only a comparatively small amount of business is being put through. Caustic soda is steady at from £16 17s. 6d. per ton for 60 per cent. to £19 7s. 6d. for 76–77 per cent. material; home and foreign demand continues on satisfactory lines. Alkali is also fairly active for both branches; prices are firm on the basis of £6 15s. per ton for 58 per cent. quality for home consumption purposes. Hyposulphite of soda is about unchanged at £14 10s. to £14 15s. per ton for photographic crystals and £9 15s. for commercial, but the demand for either is quiet. Bichromate of soda is in quietly steady demand at 4½d. per lb. Quotations for phosphate of soda still range from £13 10s. to £14 per ton, but business in this section during the week has been rather quiet. Bicarbonate of soda is moderately active at £10 10s. per ton. Soda crystals are unchanged in position or value at £5 5s. per ton. Acetate of soda is quoted at £23 10s. to £24 per ton, but the demand is poor.

Caustic potash is maintained at the recent level of £30 per ton for 90 per cent. material, inquiry being fairly active. Carbonate of potash is rather quiet but steady at £24 per ton. Chlorate of potash is still inactive but values have not changed from last week, to-day's price being round 2¾d. per lb. Yellow prussiate of potash is dull and rather weaker at 8d. to 8¼d. per lb. Permanganate of potash attracts only moderate attention, though values are now fairly steady at 7d. to 8d. per lb. Bichromate of potash is in moderate demand at 5¾d. per lb.

A relatively poor inquiry and the pressure of foreign competition are serving to depress the price of arsenic; an average current value for white powdered, Cornish makes, is £58 per ton, Manchester. Copper sulphate is steadier and in rather better demand at £24 10s. to £25 per ton, f.o.b. Commercial Epsom salts are steady and in moderate request at £4 10s. per ton; magnesium sulphate, B.P., is on offer at £6 10s. Acetate of lime is still rather quiet, but prices are unchanged at £19 for grey and £14 10s. to £15 per ton for brown. Lead acetate is still rather easy at round £48 per ton for white and £46 to £47 per ton for brown. Nitrate of lead is steady but inactive at £44 per ton.

Acids and Tar Products

Tartaric and citric acids are well held at recent rates, and the demand for these is fairly good. Tartaric is quoted at 1s. 2d. and citric at about 1s. 6d. per lb. Oxalic acid is dull but unchanged at 5d. per lb. Acetic acid is steady and in fair demand at £48 for 80 per cent. technical and round £70 per ton for glacial.

Pitch values lack strength in the absence of much actual demand, about £3 2s. 6d. per ton f.o.b. being the current value here. Carbolic acid is dull and weak at 7½d. per lb. for crystal and 2s. per gallon for crude. Solvent naphtha is fairly steady at 1s. 5½d. per gallon. Creosote oil is quiet at 7½d. per gallon. Naphthalenes are inactive at £16 per ton for refined and from £6 for crude qualities.

Company News

BURMAH OIL CO.—The directors have resolved, subject to final audit, to recommend a final dividend for the year 1923 of 4s. per share, free of tax, making 6s. (30 per cent.) for the year.

ANGELA NITRATE CO.—The accounts for the year 1923 disclose a net profit of £24,498 against £1,071 in 1922. A further dividend of 15 per cent. is proposed, making 25 per cent. for the year.

NATIONAL DRUG AND CHEMICAL CO., OF CANADA.—The net profit for the year to February 1 last amounts to £44,454. After paying all expenses and dividends there is a balance of £21,210 compared with £21,615 brought in.

THE "SHELL" TRANSPORT AND TRADING CO., LTD.—The ordinary share transfer books will be closed from June 7 to 21, both days inclusive, for the preparation of a dividend of 2s. 6d. per share free of tax, payable on July 5.

SAN SEBASTIAN NITRATE CO.—The accounts for the year 1923 show a net profit of £8,418. A dividend of 5 per cent., less tax, is proposed; £5,000 is applied in reduction of property account, and £5,948 is carried forward. The annual meeting will be held at Winchester House, London, on June 3, at 11.15.

INTERNATIONAL NICKEL CO.—The annual meeting of the stockholders of the company will be held at Oak Street, Bayonne, New Jersey, on June 17, at 11 a.m., for the purpose of electing five directors to hold office for three years, and for the transaction of such other business as may come before the meeting.

BARRENECHEA NITRATE CO.—After providing for stoppage and London expenses and corporation profits tax, the net profit for the year 1923 amounts to £3,760. A dividend of 10 per cent., less tax, is recommended. The annual meeting will be held at 27, Leadenhall Street, London, on June 10, at 12.30 p.m.

FORTH GLASS WORKS.—It is announced that the directors have decided to place a resolution before the shareholders that the concern be wound up voluntarily. The accounts for the past year show an adverse balance of £12,630. The total liabilities, including issued capital and sundry creditors, are £49,693, against which there are assets, including £12,000 for goodwill, amounting to £34,461.

YORKSHIRE DYEWARE AND CHEMICAL CO.—For the year to March 31 last, after providing for depreciation, etc., the surplus amounts to £22,562, which with £6,273 brought in makes a total of £28,835. After paying debenture interest, the directors recommend a further dividend at the rate of 12½ per cent., making 15 per cent. for the year, less tax at 4s. 6d. in the £, carrying forward £7,422. The annual meeting will be held at the Great Northern Hotel, Leeds, on June 4, at noon.

ROSARIO NITRATE CO.—For the year 1923 the company earned a net profit of £51,303, and £28,614 was brought forward. The directors propose to pay a final dividend of 6 per cent., less tax, making 11 per cent., less tax, for the year, leaving £29,179 to be carried forward. The above profit figure is arrived at after setting aside for depreciation £19,672 to cover the estimated value of raw material extracted from the grounds, and also for depreciation of plant and machinery.

LEVER BROTHERS, LTD.—We understand that this firm propose shortly to make an issue of £5,000,000 7 per cent. cumulative preference shares at par, to the holders of its 7 per cent. cumulative preference shares, 8 per cent. cumulative "A" preference shares and 20 per cent. cumulative preferred ordinary shares and to the debenture stockholders of the company, in the proportions as nearly as may be of 10 per cent. of their holdings, with a minimum allotment of 10 shares.

BENZOL AND BY-PRODUCTS, LTD.—It is stated that the profits (subject to audit), from October 1, 1923, to date exceed any previous profit figures in the company's record. It is also stated that negotiations are expected shortly to be concluded for the disposal of the Mitcham Works, which since their closing down have constituted a charge upon the company's revenue. An interim dividend of 2½ per cent., less tax, on the preference shares is announced, payable on June 2 to holders on the registers on May 21.

SCOTTISH OILS, LTD.—The annual report states that the balance at the credit of profit and loss account, including £31,465 brought in and after providing for depreciation, was £103,528. The directors recommend a dividend of 3½ per cent. on the participating preference shares, leaving £23,148 to be carried forward. The report adds that adverse conditions prevailed in the shale oil industry during the year. The company's business in imported crude petroleum was profitable towards the close of the year and prices of products somewhat improved.

New Chemical Trade Marks

Applications for Registration

[*This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, 51 and 52, Chancery Lane, W.C.2, from whom further information may be obtained.*

Opposition to the registration of the following trade marks can be lodged up to June 28, 1924.]

"LENIT."

447,197. For chemical substances used in manufactures, photography or philosophical research and anti-corrosives. Chemische Fabriken vorm. Weiler-ter-Meer (a Joint-Stock Company organised under the laws of Germany), Rheinuferstrasse, Uerdingen, Niederrhein, Germany, manufacturers. April 5, 1924.

"TERETTON."

447,274. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Foster Blackett and Wilson, Ltd., Tyne Lead Works, Blackett Street, Hebburn-on-Tyne, manufacturers. April 8, 1924.

"SOLSERVO."

447,316. For chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. Robin and Houston, Ltd., Snowdown Soap and Candle Works, Wright Street, Renfrew, manufacturers. April 9, 1924. (To be Associated. Sect. 24.)

"CREPHETTE."

446,939. For disinfectants. McDougall and Robertson, Ltd., 66 and 68, Port Street, Manchester, manufacturers. March 27, 1924. (To be Associated. Sect. 24.)

"THERAFOR."

445,443. For chemical substances prepared for use in medicine and pharmacy, not being tablets, pastilles, lozenges or pills. British Dyestuffs Corporation, Ltd., 70, Spring Gardens, Manchester, manufacturers of dyestuffs and chemicals. February 15, 1924. (By consent.)

"SYNCHROME."

446,094. For raw, or partly prepared, vegetable, animal, and mineral substances, used in manufactures, not included in other classes, but not including dyes, and not including any goods of a like kind to dyes. S. Gibson and Sons, Hough End Tannery, Hough End, Bramley, tanners. March 8, 1924. (To be Associated. Sect. 24.)

"MAJULL."

447,028. For raw, or partly prepared, vegetable, animal, and mineral substances used in manufactures, not included in other classes. Major and Co., Ltd., 12, Norfolk Street, London, W.C.2, manufacturers. March 31, 1924.

[*Opposition to the registration of the following trade marks can be lodged up to June 21, 1924.*]

"NEWCOL."

447,213. For disinfectants. Newton Chambers and Co., Ltd., Thorncliffe Ironworks and Collieries, near Sheffield, manufacturers. April 7, 1924.

"LINULA."

445,337. For linseed oil, for use in manufactures. Hugh Wallace Aitken, Britannic House, 4, Park Circus, Glasgow, engineer. February 12, 1924.

"ACHILLES."

447,102. For rosin. Langley-Smith and Co., 14 to 20, St. Mary Axe, London, E.C.3, merchants. April 2, 1924.

Less Unemployment

THE NUMBER OF PERSONS on May 19, 1924, recorded on the registers of employment exchanges in Great Britain was 1,021,000. This was 5,138 fewer than on May 12, 1924, and 264,623 fewer than on December 31, 1923.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that occur.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

BELL (JOHN), HILLS AND LUCAS, LTD., London, S.E., manufacturing chemists. (M., 31/5/24.) Registered May 15, £250 and £150 debentures, dated April 10, 1912, and April 1, 1914; general charge. *£2,500. April 5, 1922. (See Satisfactions.)

DIAMOND SODA CO., LTD., London, E.C. (M., 31/5/24.) Registered May 15, £900 3rd debentures (filed under section 93 (3) of the Companies (Consolidation) Act 1908), present issue £300; general charge. *£400. February 16, 1924.

RIMMINGTON (F. M.) AND SON, LTD., Bradford, chemists. (M., 31/5/24.) Registered May 13, £17,500 and further advances mortgage, to Building Society; charged on 9, 11 and 13 Bridge Street, and 7 and 9, New Ivegate, Bradford. *Nil. December 31, 1922.

Satisfactions

BELL (JOHN), HILLS AND LUCAS, LTD., London, S.E., manufacturing chemists. (M.S., 31/5/24.) Satisfaction registered May 15, £650, registered April 1, 1911, and May 15, 1924.

PARK GREEN DYE WORKS, LTD., Macclesfield. (M.S., 31/5/24.) Satisfaction registered May 20, £300, registered October 31, 1922.

London Gazette

Partnership Dissolved

TIMM AND ATKINS (George William TIMM and Samuel ATKINS), dry cleaners and laundry specialists, 335, Stanley Road, Kirkdale, Liverpool, by mutual consent as from May 17, 1924.

New Companies Registered

W. BAMFORD AND SONS (CHEMISTS), LTD., 242, Yorkshire Street, Rochdale. Chemists, druggists, drysalters, oil and colourmen, etc. Nominal capital, £3,000 in £1 shares.

BOLTON PAINT AND VARNISH CO., LTD., Toothill Bridge Works, Bury Road, Tonge, Bolton. Paint and varnish manufacturers. Nominal capital, £3,000 in £1 shares.

CLERKENWELL SMELTING CO., LTD., 52, Clerkenwell Road, London, E.C.1 Smelters and refiners, chemical manufacturers, metallurgists, etc. Nominal capital, £100 in £1 shares.

FLOROGEN CO., LTD.—Manufacturers and dealers in perfumes, chemicals and other preparations and proprietary articles, etc. Nominal capital, £1,000 in £1 shares. Solicitors: Billinghurst Wood and Pope, 7, Bucklersbury, London, E.C.

GELATA PRODUCTS CO., LTD., Riverside, Haltwistle, Northumberland. Manufacturers, exporters and importers of rosin, size used in the papermaking, textile and other industries, etc. Nominal capital, £3,000 in £1 shares.

GORES, LTD., 72, Avenham Lane, Preston. Chemists, druggists, exporters and manufacturers of and dealers in pharmaceutical, chemical, industrial and other preparations, etc. Nominal capital, £1,000 in £1 shares.

W. PROSSER THOMAS & CO., LTD., 10, Wern Road, Ystalyfera, Glam. Manufacturing and dispensing chemists, chemical brokers, drysalters, etc. Nominal capital, £500 in £1 shares.

PURE WAX-PRODUCTS, LTD., Old Well Works, Wembley. Manufacturers of and dealers in waxes, fats, oils, abrasives, perfumes and chemicals of all kinds. Nominal capital, £1,000 in £1 shares.

A. TWIGG AND CO., LTD., 390A, Corn Exchange Buildings, Corporation Street, Manchester. Dealers in chemicals, oils, paints, drugs, etc. Nominal capital, £1,000 in £1 shares.

JAMES WILKINSON AND SON, LTD., Tinsley Park Road, Attercliffe, Sheffield. Manufacturing chemists. Nominal capital, £25,000 in £1 shares.

Chemical Trade Inquiries

The following inquires, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

TENDERS INVITED FOR CENTRIFUGAL PUMP.—The Wellington City Council, New Zealand, are inviting tenders for the supply and delivery of one electrically driven multi-stage turbine pump. Sealed tenders, accompanied by a deposit of £20, will be received by the Town Clerk, Town Clerk's Office, Wellington, New Zealand, up to 5.30 p.m. on Thursday, August 14, 1924. British firms interested can obtain further particulars from the Department of Overseas Trade. Ref. No. AX1001.

CHEMICALS, DRUGS, ETC., FOR AUSTRIA.—A firm in Innsbruck, Austria, desire to secure the representation of British manufacturers or exporters of white lead, linseed oil, pig lead, drugs, chemicals and colours. (Reference No. 627).

"Chemical Age" Inquiry List

The following inquiries have been received from readers of "The Chemical Age." Replies addressed to the box number given below, c/o "The Chemical Age," 8, Bouverie Street, London, E.C.4, will be forwarded to the inquirers.

A subscriber in Amsterdam is desirous of obtaining the names and addresses of the most important British manufacturers of Paint and Varnish (Cellon); artificial resin; Galalith; and hexamethylentetramine.—No. H.39.

The names are required of manufacturers or sellers of calcium cyanamide.—No. H. 40.

Smokeless Coal Producing System

The Commercial Counsellor at Washington has forwarded a copy of a letter concerning a system of producing smokeless coal, covering in original a deed of gift to the "British Public" granting a general right to the use of the British and United States patents for this process. Copies of the patents relating to this invention have also been received. These documents can be inspected by interested British firms at the offices of the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. (Reference No. 22949/F.W./E.P.)

Tariff Change

UNITED STATES OF AMERICA.—Under the "flexible tariff" provisions the duty on sodium nitrite has been increased from 3 cents to 4½ cents per lb.

Tully Gas Plants Voluntary Liquidation

THE creditors interested in the voluntary liquidation of Tully Gas Plants, Ltd., 40–43, Norfolk Street, Strand, London, W.C., were called together on Saturday, May 24, at the Institute of Secretaries, London Wall, E.C. In the circular calling the meeting it was stated that the voluntary liquidation was taking place as part of a scheme for the amalgamation of the company with Gas and Fuel Plants, Ltd., of the same address. The company named at present held the construction rights of the Low Temperature Carbonisation Process. Arrangements had been made for Gas and Fuel Plants, Ltd., to carry on the business of Tully Gas Plants, Ltd., during the liquidation of the latter, and creditors desiring to continue their business with the first-named might transfer their accounts to it. The liabilities of the company were about £21,000, whilst the assets were in the neighbourhood of £50,000. The liquid assets consisted of book-debts and stock £20,000, and freehold buildings, plant, machinery, etc., £30,000. The liquidator stated that it was estimated that the whole of the liabilities would be paid in full within a comparatively short time.

A resolution was passed confirming the voluntary liquidation of the company with Mr. W. B. Anderson, C.A., of Norfolk Street, Strand, W.C., as liquidator.